HANDBOOK OF COMMERCIAL GEOGRAPHY

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BY

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Ed. 9

NEW EDITION

WITH MAPS AND DIAGRAMS

LONGMANS, GREEN AND CO.
39 PATERNOSTER ROW, LONDON, E.C. 4
NEW YORK, TORONTO
BOMBAY, CALCUTTA AND MADRAS
1922

BIBLIOGRAPHICAL NOTE

First Edition, August 1889. *Reprinted with corrections, May* 1890. *New Edition revised, May* 1892. *Reprinted: January* 1894, *October* 1896, *May* 1899, *June* 1900, *March* 1901, *April* 1902. *Fourth Edition, revised throughout and greatly extended,* 1903. *Fifth Edition,* 1904. *Sixth Edition,* 1906. *Seventh Edition, revised throughout and extended,* 1908. *Eighth Edition, March* 1911. *New Impressions: July* 1913, *September* 1914, *June* 1915, *June* 1916, *January* 1918, *January* 1919, *and February* 1920. *Ninth Edition, May* 1922.

PREFACE

THIS work is old enough to have undergone a process of evolution, the nature of which may be conveniently indicated by extracts from prefaces to previous editions. Its aim is stated in the first edition as follows :—

'This book is designed to meet a want recognised by all who are interested in adapting our education to the needs of the time.

'Since its commencement several works have appeared which seek to accomplish a similar object by methods different from those adopted in the present work. A few words of explanation as to the plan here followed are therefore all the more necessary.

'I cannot better explain the aim of the work than by adopting the words of Mr. Goschen in the address which he delivered to the students of Aberdeen University on his installation as Lord Rector (Jan. 31, 1888). I have endeavoured to impart an "intellectual interest" to the study of the geographical facts relating to commerce. It will, I imagine, be generally admitted that Mr. Goschen has not overrated one whit the importance of this intellectual interest with a view to practical success in business ; and it is a consideration by no means to be ignored that in following this road to practical success we give to life one of the elements that make success valuable.

'To say that in the present work I have endeavoured after intellectual interest is only another way of saying that it has been my aim to make the book really educational. In writing the work I have had three classes chiefly in view—first, teachers who may wish to impart additional zest to their lessons in geography from the point of view of commerce ; secondly, pupils in the higher schools and colleges that are now devoting increased attention to commercial education ; and thirdly, those entering on commercial life, who take a sufficiently intelligent interest in their business to make their private studies bear on their daily pursuits.

'From what has just been said about the aim of the work, it follows that this book is not to be regarded as a general work of reference on all that may be included under the head of Commercial Geography. It is not a mere repertory of the where and whence of commodities of all kinds. My wish has been to throw light on the vicissitudes of commerce by treating somewhat fully of the trade in the more im-

portant commodities, and emphasizing the broad features of the trade of different countries, not to encumber the book with a multitude of minute facts. . . .

'As regards statistics, it will be observed that there has been greater anxiety to make figures instructive than to furnish the latest figures procurable. In a work not designed as a year-book, the main thing is to make the figures so far as possible comparable with one another. My chief aim in the collection of statistics has been to illustrate tendencies in progress. In the body of the book the statistics given under the head of Commodities are mostly of quantities. In the general tables in the Appendix showing the commerce of different countries of the world for certain periods, I have been obliged to use the only common measure available, that of value, with all its defects. It is necessary, however, to warn the reader that in consulting these tables the great defect pointed out in par. 228,[1] and illustrated by the figures on pp. 708–9,[1] ought never to be left out of mind. In making use of these statistics in the body of the book I have endeavoured to do so in such a manner that what may be learned from them on the assumption of uniformity of prices is all the more manifestly true when actual changes in price are taken into account. In order to remove one of the defects attached to the use of values as measures for comparison—namely, the changes in the relative value of gold and silver or inconvertible paper—the tables have all been made to represent as far as possible gold values. . . .

'The plan of giving the average value of imports and exports for periods of five years has been resorted to with the view of showing more clearly the tendencies of commercial development. Such periods seemed long enough to mask what may be called accidental fluctuations from year to year, and at the same time they are short enough to show a number of successive stages in recent years. . . .'

In the preface to the fourth edition it is stated that 'eleven years have passed since the appearance of the last corrected edition of this work. During the greater part of the interval I have been engaged in lecturing on the subject of which it treats, and my experience in that capacity is the cause of the chief difference between this and the previous editions. That experience has brought home to me the degree to which the value of geographical conditions is altered by the circumstances of the time, and for that reason new paragraphs have been added throughout the present volume indicating briefly the connection between Commercial Geography and Commercial History.'

The principal extension in the seventh edition was 'due to the insertion of the chapter on Trade Routes . . . with the accompanying maps showing express and transcontinental railway routes in Europe, Eurasia, and North America.'

Considerable extensions were made in the fourth and eighth editions

[1] References altered to agree with the present numbering.

by the insertion of new introductory matter with a separate paging from the rest of the book.

Preparations for a ninth edition were begun in 1913, and were nearly completed when the war broke out. This expression, 'the war,' now recurs again and again in the text, and one can only hope that the war referred to will prove to be such an unmistakable epoch in history as to leave no doubt as to what war is meant. When war was declared, both the publishers and I agreed that it would be altogether inopportune to publish a work of the scope of the present when the geography of almost the entire world was about to be upset. Publication was accordingly postponed till after the conclusion of the principal peace treaties.

All the time, however, preparations for the new edition were going on, and the work now appears in a form more completely recast than any previous edition. The resetting of the entire book and the renumbering of the paragraphs have allowed of interpolations and rearrangements of matter on a much greater scale than ever before. The introductory matter of the fourth and eighth editions has been put in its proper place in the text, and subjects that seemed to me to require further elucidation have been dealt with at greater length. Such additions are scattered throughout the book, but the principal additions are under Climate (with new illustrative maps), Commercial and Industrial Towns, Coal, and The British Isles. It is this last section that has been most considerably extended, but not so much by the addition of new matter as by the incorporation of matter previously in one or other of the introductions.

Notwithstanding the delay in publication, the work is still issued to an unsettled world, and one of which the settlement on a basis allowing of a new period of orderly evolution seems still remote. Comparisons under the head of value between pre-war and post-war conditions seem to me to be hardly ever possible, and for that reason no average values are given in this edition for periods subsequent to 1913, or the fiscal year 1913–14, where the fiscal does not correspond with the calendar year. International values have of course a meaning in individual transactions, but in present conditions I can attach no meaning to average values for any period comparable with those of pre-war periods, and therefore I do not choose to encumber my pages with data of which I cannot myself discern the use. It is doubtful, indeed, whether we shall ever be able to get such figures.

The statistical tables down to 1913 inclusive have, however, been considerably extended and increased in number. These, it seems to me, will always be instructive, and prove all the more so the more closely and more carefully they are studied. They should serve, when combined with the necessary correlative studies, as an important means of illustrating the constraining influence of geographical conditions and the multiform modes of that influence. In saying

this I do not mean to hint that man has no control over his own destiny. But he must stoop to conquer. To subdue nature he must submit to nature's laws, and the more reverently he does so the better will it be for him. With the passing of the centuries he can indeed go further and further in that conquest. But at all times the earth says 'thus far and no further'; and it is impossible to foresee a time when we shall be able to look upon geographical studies as superfluous.

Though, for the reason stated, no statistical tables subsequent to 1913 similar to those previous to that date are given, columns have been added to the tables for the United Kingdom and the United States showing the differences in the trade in individual commodities in 1919 as compared with 1912, both in quantity and value. These will serve to illustrate the chaos which has been introduced into values by the war, and the same purpose is served by another table in the Appendix (p. 712) giving the value for the same unit of a number of commodities in the two years mentioned. This table was originally compiled before the war for the year 1912, for the purpose stated where the table is inserted, and the 1919 figures were afterwards added as likely to prove instructive in many ways.

What has been said as to the preparation of this new edition will make it plain that the work has had in a large measure to be done twice. My share in the work has been willingly given. I have at least had the satisfaction of thinking that it had a double purpose—that it served for the benefit of my university classes as well as the interests of the book. But, whatever my share in the work may have been, the new edition could not have been produced at all without the aid of devoted assistants.

In the first revision, that before the war, my principal assistants were Miss A. B. Lennie, M.A., B.Sc., Junior Lecturer in my department at Edinburgh University, and Mr. Charles T. Macgregor, M.A., a former student in my classes, Teacher of Geography in Boroughmuir Secondary School, Edinburgh. Besides giving other assistance too miscellaneous to mention, they calculated all the new and extended tables of Exports and Imports down to the period 1906–10 inclusive independently, so as to allow of the tables being checked by comparison of the results. For all the columns subsequent to 1906–10 Miss Lennie is alone responsible. Miss Lennie also compiled the two tables of prices in the Appendix, prepared or revised some of the tables and diagrams in the text, and compiled the new map of Africa, not merely showing the existing railways but distinguishing their gauges.

During the second revision, my principal assistants were Mr. J. Hamilton Birrell, M.A., F.R.S.G.S., another former student of mine, Senior Geography Master, Boroughmuir School and Training Centre, and Tutor in Commercial Geography under the Workers' Educational Association, Edinburgh, and Mrs. Elizabeth Hardie, L.L.A., of the editorial department of Messrs. Thos. Nelson & Sons, Ltd. Both of

these have read all the proofs of the book, and to both I am indebted for numerous corrections and suggestions. Mrs. Hardie has seen to the accuracy of the cross-references to paragraphs, all of which of course had to be changed in consequence of the re-numbering, and supplied the head-lines for the pages. To Mr. Birrell I owe the preparation of the list, now so much needed, of different geographical names for the same place, with the pronunciation of those names. My thanks are also due to Mr. K. T. Sen, M.A., B.Ed. (Edin.), for suggestions made on the proofs of the section on China, and I must also express my warm thanks to the printers for their vigilance in calling my attention to many points requiring correction or consideration. For the compilation of the index I am indebted to Mr. G. A. Frisby.

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January 1922.

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NOTE

Town populations are usually given at the foot of the page; in some cases, where the sections are short, at the end of the section. Those of the inland towns of Germany are given on p. 401; those of all towns of above 150,000 inhabitants in the United States on p. 646. All the numbers are more or less rounded, and, where the necessary information is available, not municipal or city populations, but those of urban aggregates are given, for the reason stated in note 3, pp. 333–4. The town populations for Great Britain are based on the preliminary returns of the census of 1921, either the municipal or parliamentary borough, the larger being always taken as being most likely to correspond with the urban aggregate. In most other cases the populations are based on those given in *The Statesman's Year-Book* for 1921, by kind permission of Messrs. Macmillan and Co.

Black figures in parentheses—thus, (**275**)—are references to other paragraphs. Where paragraphs are subdivided into numbered sections, the reference is made in this form (**571·9**), which means the ninth section of paragraph **571**.

ERRATA

Page 288, line 23, *for* Châlon *read* Chalon.

Page 290, line 12, *for* Confranc *read* Canfranc.

Page 499, line 3 of note, *for* 'Julfa (adjoining Isfahan)' *read* 'Julfa on the north-west frontier.'

Page 690. The railway from Kalgoorlie to Port Augusta is on the 4′ 8½″ gauge.

HANDBOOK

OF

COMMERCIAL GEOGRAPHY

INTRODUCTION

1. The great geographical fact on which commerce depends is that different parts of the world yield different products, or furnish the same products under unequally favourable conditions. Hence there are **two great results of commerce;** the first, **to increase** the **variety** of commodities at any particular place; the second, **to equalise** more or less, according to the facilities for transport, the **advantages** for obtaining any particular commodity in different places between which commerce is carried on. Among the difficulties of transport to be overcome we here include all the profits necessarily levied in the transference of goods from hand to hand (profits of exchange).

2. The variety of products in different places is due either to artificial production, whether by cultivation or manufacture, or to original distribution. The original distribution of minerals of economic value is an important matter for consideration in commercial geography, but under this head we must consider, not merely the latitude and longitude of the place of occurrence, but all the varied conditions, local, political, or historical, which help to render mineral deposits commercially available. Original distribution under the same provisos is likewise the prime consideration in the case of forest products, where the forests have not been planted by the hand of man.

3. In the case of cultivated products, soil and climate are considerations of first importance in determining the variety obtaining at different places. But even with reference to such products these are not the sole considerations. Facilities for finding a market, and all the conditions that affect these facilities, have also to be taken into account.

4. The cost, in labour, of bringing goods from one part of the world to another has been greatly reduced since the time of the earliest commerce of which we can get a glimpse. On the whole, there has

been a gradual development of the means of transport; but the rate of development has been very unequal in different regions and at different times, and in our own age it has attained the highest pitch yet reached. As this development has proceeded, the variety of products entering into commerce and obtainable at particular places has constantly increased. In the earliest periods the articles in which commerce was carried on on a great scale, involving the longest and costliest journeys, were necessarily such as were of great value in proportion to their bulk. Such commerce supplied chiefly the luxuries of the rich, and commodities on which a high value was conferred by religion. Records of early Egyptian, Assyrian, and Phœnician trade speak of gold, silver, and precious stones, ebony and fine woods, ivory and inlaid work, incense and perfumes, balsams and gums, apes, peacocks, panther-skins, and slaves as the principal gifts of commerce. Indian dyes (indigo) appear to have reached Egypt in the time of the eighteenth dynasty (1700–1475 B.C.); Baltic amber was probably brought to Assyria in the time of Tiglath-pileser II. (eighth century B.C.); and Chinese silks are known to have reached the Indus through Afghanistan in the fourth century B.C., though probably without anything being known in the country where the goods were bought of the country in which they originated. The silks were no doubt gradually transferred from tribe to tribe on the route, and in this manner they are likely to have occasionally reached the West at a much earlier date.

5. The trade in bulky articles such as grain brought from a distance was necessarily confined to regions easily brought into communication with one another by good water carriage. From an early period in Greek history the necessity for this trade gave peculiar importance to the grain-growing regions on the northern shores of the Black Sea.[1] Rome at the height of its prosperity first made Sicily a granary for central Italy during the later period of the Republic, and under the Empire grain was likewise obtained from Egypt and Cilicia, Mauretania and Spain. Sea carriage within the Mediterranean rendered all these sources of supply easy of access; but where distant land carriage was added, especially for the materials of an artistic product, the prices demanded were such as only the wealthiest could pay. Varro in the first century B.C. mentions citron-wood along with gold as among the costliest luxuries at Rome, and about the same date as much as 1,400,000 sesterces (10,500*l.*) was paid for Alexandrian tables made of thya-wood (the wood of *Callitris quădrivalvis*) with ivory feet.

6. Coming down to the most flourishing period of the trade of Italy with the East, that is, towards the close of the fifteenth century, just before the discovery of the sea-way thither (**157**), we find that the principal articles of commerce were raw silk, silk-stuffs and other costly

[1] Since the publication of the last edition of this work this has been brought home to all geographers by G. B. Grundy's *Thucydides and the History of His Age* (Murray, 1911).

manufactures, spices and drugs. At Antwerp in 1560, after the sea-way to the East had been fully established, and that city had attained the summit of its maritime and commercial prosperity, though the commodities that were dealt in include leather, flax, tallow, salt fish, timber, corn and pulse, and other articles of general consumption, there is a remarkable prominence of costlier articles, such as wrought silks and velvets, cloth of gold and silver, tapestries, dimities of fine sorts, jewels and pearls, dyes and perfumes, drugs and spices.

7. In Shakespeare's time we know from Shakespeare himself that sugar, currants, and dates, rice, mace, nutmegs, and ginger, as well as civet and 'medicinable gum,' were all familiar articles in England, while the manufactured products of the time comprised, among others,

> Fine linen, Turkey cushions boss'd with pearl,
> Valance of Venice gold in needle-work.

Tobacco, though not mentioned by Shakespeare, was already in use in England. Of the articles mentioned, however, some that are now within the reach of every one must have been, at the period referred to, comparatively rare luxuries. Without going beyond Shakespeare we get a hint that rice was dear. 'What will this sister of mine do with rice? But my father hath made her mistress of the feast, and she lays it on.' From other sources we learn the cost of some of the other tropical products mentioned. In 1589 a quarter of an ounce of tobacco cost in England 10*d.*, 1 lb. of sugar 20*d.*; and the difference in money value between then and now gives an inadequate idea of the actual difference in cost, for we find from the same source that a pound of sugar then cost (at least in the country) as much as a quarter of veal or mutton.[1]

8. The contrast between Shakespeare's day and our own is striking in many ways. Tea, coffee, and cocoa, besides other minor but still familiar articles, such as sago and tapioca, have all been added, along with a host of others, to the list of mercantile commodities. The price of tropical products has been so reduced that, for example, sugar, coffee, and tobacco have all become necessaries of life even in the Arctic home of the Laplanders. In the trade of the world almost universally the articles of greatest aggregate value have come to be the natural products, raw materials, and manufactured articles in most general use —wheat, rye, and rice, bacon and hams, butter and cheese, cotton and cottons, wool and woollens, iron and iron-wares, besides leather and leather wares, &c. Even in the export trade of India spices have disappeared from the list of the first nine articles, and, as may be seen from the tables in the Appendix, the principal commodities exported from that country are mostly bulky raw commodities. One drug only, opium, continued till the twentieth century to take a leading

[1] Hall, *Society in the Elizabethan Age*, pp. 200–1.

place among the exports, and this would have been of comparatively small importance had it not been for one great market (China).

9. We thus see that the increasing variety of commodities entering into commerce is in a great measure an increase in the commoner articles of consumption. To get an idea of the extent of the variety that has been attained through the gigantic and complicated commerce of the present day, there is no better method than to examine the price-list of one of the great miscellaneous retail shops now so common.

10. The **equalising tendency of commerce** has already been incidentally illustrated by the reduction of price of tropical commodities just referred to; but this tendency needs a little further elucidation.

The tendency may be described, **first**, as one **towards** equality of prices from year to year—in other words, to **stability of prices**; a tendency manifested most conspicuously in the case of those commodities the supply of which in any particular region, apart from commerce, is largely dependent on the weather. Between 1641 and 1741 the price of wheat per quarter in England oscillated between 23*s*. and 76*s*.; in the period from 1741 to 1841, between 22*s*. and 129*s*., the highest prices being reached during the period of the Napoleonic wars; in the period 1842 to 1883 the limits of oscillation were only 39*s*. and 75*s*., the latter figure being reached only during the Crimean war.

11. But the tendency of which we are now speaking is, secondly, a tendency **towards equality of prices in different regions of production**; a tendency in perfect keeping with that just spoken of, being in fact due to the same cause. Excessive prices in one region are kept down by supplies sent from other regions where the commodity is cheap, and the sending away of the surplus from these latter regions tends to raise the price in them. The effect of this nature attributable to commerce is best recognised by observing the conditions that prevail in places where communications are still very imperfect and commerce consequently limited. Quito, a town in the Andes at the height of nearly 10,000 feet above sea-level, could be reached from Guayaquil, the principal port on the coast, only by means of pack-animals, which had to travel a distance of 320 miles. Here, accordingly, local produce was exceptionally cheap, but imported articles were excessively dear. Beef sold at from 2*d*. to 2½*d*. a pound, mutton 1½*d*. to 2*d*., chickens 6*d*. to 7½*d*. apiece; ordinary labourers received about 6*d*.; carpenters, stonemasons, and other artisans about 1*s*. a day, finding their own food. On the other hand, dry goods, hardware, common cutlery, crockery, and imported furniture were from 25 to 50 per cent. higher than in foreign markets; and common ironware cost fully twice as much as in the countries from which it was brought.[1] So also in Turkey, where the paucity of railways and the mountainous character of the country made communication difficult, wages were comparatively high in Constantinople, extremely low in distant villages and rural districts. In

[1] *U.S. Cons. Reports*, 53, p. 49. (The report is dated April 11, 1885.)

general, the more complete the system of communications the more nearly equal are prices.

12. Now it has to be noted that while the tendency of commerce is towards comparative steadiness in prices, yet the level towards which the price tends is not the lowest level in any place of production. Merchants sell abroad because they can thus get a better price than at home. It is their quest after higher prices that reduces the inequality under this head in different parts of the world. To them the advantage of an extended commerce is this, that the wider the commerce the greater is their choice of customers.

13. Hence there follows a third great result of the growth of commerce, namely, the development of the resources of different regions to the utmost extent possible under the existing conditions, whatever these may be, and with this development the keenest and most widespread competition, which is, indeed, only another aspect of the same great fact.

14. But in process of this development it becomes apparent that the equalising tendency of commerce on which we have insisted is only a general tendency, which is apt to be masked now and again by disturbances, by great variations in price, due directly or indirectly to the operations of commerce itself.

These disturbances may arise from inventions causing a sudden cheapening in the processes of production, such as the great textile inventions or those which gave rise to the modern methods of steel-making (**531-5**); they may arise from the introduction of cheaper means of transport, and the disturbance due to this cause is felt all the more keenly when the cheaper transport is to regions in which there is exceptionally cheap labour or cheap land, and still more when it leads to the rapid settlement of land of unused and extraordinary fertility; or they may arise from a vast and rapid expansion of the demand for some commodity—an expansion such as is only possible since commerce has come to be pursued on the extensive scale characteristic of the present time.

15. Such disturbances are sure to inflict hardship somewhere. The transition from domestic industry in spinning and weaving to the factory system is too far in the past in our own country for the attendant hardships of that transition to be remembered, or even generally known; but these hardships are still being felt in some parts of the Continent, as in Germany (**841**) and Russia (**915**). In India we have, first of all, seen hand-spinners and weavers starved out of existence by the commerce in English machine-made cottons, and subsequently a vigorous competition with our own cottons in the East arise from the development of a mechanical textile industry based on local advantages (**377**). The effects of other causes of disturbance are illustrated in the recent history of the wheat trade, with reference to which see pars. **246-67,** where an explanation is attempted of the circumstances

that led to the decline of the price of wheat in England from an average of 45*s*. 1*d*. in 1882 to an average of 22*s*. 10*d*. in 1894. The effect of the last of the causes of disturbance referred to at the end of the last paragraph is seen in the history of the iron trade after 1870. The average price of pig-iron warrants at Glasgow in the years 1869 to 1871 varied between about 53*s*. and 59*s*. per ton; in 1872 the average rose to about 102*s*., in 1873 to 117*s*., after which it fell steadily to about 54*s*. in 1877. The sudden rise was due to the fact that, vast as our own commerce and industry had already become in 1872, it was not yet equal to the demands that were then made on it for the further expansion of commerce by the laying of numerous railways, and the establishment of numerous factories in America and Germany.[1] But in the subsequent course of iron prices the general equalising tendency of commerce can still be detected. The vast demand of 1871 to 1873 led almost immediately to such an increase in the means of producing iron, that when the next great expansion of the demand came about it was met with greater ease and with less oscillation of prices. From 1877 to 1887 the extreme variations in average annual price of pig-iron warrants at Glasgow were only about 40*s*. and 54*s*. 6*d*.

16. Inevitable as the hardships attendant on such disturbances are, still the improvements that bring about such incidental results are of value to the world in the long run, in so far as they afford the means of permanently lightening human labour in the production and distribution of the means of satisfying human wants. That they do so for an ever-increasing proportion of the inhabitants of the world would appear to follow from the fact to which attention has already been drawn, the increasing proportion of the necessaries of life and the articles of most general consumption entering into the aggregate commerce of the world. The large and quick-sailing ships, the numberless railway trains, in short all the vast apparatus that now stands at the service of commerce, can be kept working only by transporting commodities consumed in the largest quantity, such therefore as satisfy the wants of the multitude.

17. But if there is any permanent benefit to mankind at large from the development of which we are now speaking, it is worthy of note that the full advantage of this nature is not reaped until every kind of production is carried on in the place that has the greatest **natural advantages** for the supply of a particular market. By natural advantages are meant such as these—a favourable soil and climate, the existence of facilities for communication external and internal so far as these lie in the nature of the surface and physical features, the existence of valuable minerals in favourable situations, and especially of the materials for

[1] The annual increase of railway mileage in America rose steadily from 1,177 miles in 1865 to 7,379 miles in 1871. The annual exports of iron and steel from the United Kingdom to the United States increased steadily from 186,000 tons in 1865 to 1,064,000 tons in 1871; those to Germany, Holland, and Belgium increased year by year from 255,000 tons in 1866 to 1,015,000 tons in 1872.

making and driving machinery, these being among the products which are least able to bear the cost of carriage. All these advantages are more or less permanent, or at least such as are exhaustible are for the most part liable to exhaustion only by slow degrees.

18. With natural advantages may be contrasted **historical advantages,** which are in their nature more temporary, though they are often in fact of long continuance. Perhaps the most important of all is a strong government based on just and fixed principles not hostile to industry ; and this, it may be observed, is one of those which may be very enduring in fact, as the disadvantage arising from the want of that condition is very apt to be.

19. Inasmuch as some advantages for commerce and industry are thus temporary in their nature, it is necessarily more or less perilous for a country to have its commercial and industrial prosperity based chiefly on advantages of this kind ; and there are numberless examples in history to show the hardship and disaster that may result from the withdrawal of the advantages on which a temporary superiority was based. We may refer in illustration of this to the losses that fell upon Italian commerce after the discovery of the sea-way to the East (215), the prosperity of that commerce being based in a large measure on the central position of Italy—a position which was permanent only so long as the geography of the world was imperfectly known. It is specially disadvantageous for any country when the temporary prosperity of any of its chief industries is based on a circumstance that must in itself be regarded as disadvantageous—such, for example, as low wages.

20. With reference to the temporary character of certain advantages for commerce and industry, it is likewise a fact of the greatest moment that, viewed broadly, the commerce and industry of the world have for more than a hundred years been in a transition stage the like of which has not been known since the discovery of the sea-way to the East and of the New World. Communications are being improved, the means of production are being accelerated and cheapened, uncultivated lands are being settled, strong governments are being established and extended with a rapidity hitherto unparalleled—with incidental results, as we have seen, not always the most desirable. Commerce and industry thus tend to be governed more and more by geographical conditions, which accordingly demand the most careful and detailed examination, an examination much more thorough than can be attempted within the limits of this work.

21. The statement just made is often denied, and that in such a manner as to suggest not merely that the opposite is the truth, but too obviously the truth for that to be called in question. This difference of opinion results from a difference in the point of view, but the point of view of those who contend that geographical conditions are counting for less and less instead of more and more seems to me the one less conducive to clearness. Those who hold this view will point out that

now where an isthmus stands in man's way he cuts it, a mountain, he bores it. True, but those who think only of this fail to notice that in the case of those epoch-making achievements wide-reaching geographical relations determine what isthmuses to cut, what mountains to pierce, and a close study of the local conditions is made to decide where and how the works had best be carried out. Railways, we are told, make man no longer dependent only on inland waterways for the carriage of bulky produce long distances. True, but just because railways are so useful when constructed, but so costly to construct, their routes are more carefully studied than those of ordinary roads, and, be it noted, all the more carefully the more efficient they become. Now, in the laying of railways through hilly or mountainous country more care than ever is being taken to avoid stiff gradients and sharp curves. The steepness of the gradient on the west side of the Kicking Horse Pass across the Rocky Mountains ultimately compelled the Canadian Pacific Railway to provide an easier descent at the cost of a somewhat lengthened route (**1253**). In the north-west of Switzerland an even more striking change has been made under the imperious demands of modern competition. A tunnel already existing at a high level through the Hauenstein has been superseded by another nearly at base level. In some cases the influence of the superficial configuration of a region or the traffic it supplies on the means of transport is seen in another way, as the determining cause of electric in place of steam haulage.

22. The opening up of the entire world by improved means of communication is leading capitalists to search out every part where development is possible and to remove obstacles to development wherever that can be done, but the very fact that man is acquiring greater power in dealing with nature makes clearer the limit beyond which he cannot pass in his modifications of the original conditions. Nowhere is this clearer than in the creation of oases, where lie side by side 'the desert and the sown.' Irrigation in recent years has been greatly extended in many parts of the world, but geographical conditions determine just where it is possible. A glance at the irrigation map of the western United States at par. **1291** is enough to show how small a proportion of a vast arid region is capable of being thus reclaimed. The tendency of which we are now speaking towards an ultimate prevalence of geographical conditions in determining the distribution of commerce and industry is, it is true, a tendency to a remote result. The influences tending to localise industries in particular regions are indeed very varied and complex in their action, especially in modern times. On this subject the reader is referred to what is said under Commercial and Industrial Towns in paragraphs **192-213**, and here it is enough to add that the chief means of thwarting the dominant tendency of geographical conditions in commerce and industry is not man's increasing control over nature, but his political action,

which, either by tariffs or by other means, may direct commerce more or less into certain channels.[1]

23. The advantages that may be expected to be reaped when the development of commerce has reached its goal are the enjoyment of the greatest possible variety of commodities at all the habitable parts of the earth (that is, the greatest variety possible for each place), and the utmost attainable stability of prices. When the network of commerce is complete in its main lines, when it has only to be gradually and regularly extended or made more intricate with the development of population, the deficiencies in the natural products of one region will be supplied with the least possible delay and at the least possible cost from any surplus that may accrue in other regions. It is true that this will take place only on condition that the region so supplied has something to give in exchange for that which is supplied; but with reference to this proviso, it is an important consideration that the stability of prices towards which a fully developed commerce tends is in itself in the highest degree favourable to that foresight which is the necessary condition of ensuring that stability. It facilitates a just estimate of the future. Rendering foresight easier it makes prudent conduct more certain of reward, and may be expected, therefore, to render its practice more general among the community.

24. Meantime, however, it cannot be forgotten that, however fast commerce may seem to be hastening towards its goal, it is still very far from having reached that goal. What we now see, accordingly, is the greatest haste on all sides to secure such advantages as may offer themselves for the prosecution of commerce and industry; we see an extreme phase of competitive and aggressive commerce as between nation and nation, individual and individual.

25. It is only with nations that we have here to do, and we may now note the principal means by which nations, whether through their governments or through other institutions, endeavour to promote their own commerce and industry.

26. As the first of these means may be mentioned protective tariffs; that is, duties levied upon imports upon such a scale as to encourage the production of the goods so taxed in the country itself by the total or partial exclusion of such goods of foreign origin. It is obvious that by this method only certain branches of internal commerce of a country are fostered, and the external commerce of the country is hampered. But it may be pointed out that in so far as such duties may be necessary or may help to establish an industry in a region in which it is fitted by natural advantages to take root and flourish independently of such fostering, the imposition of duties of this nature tends in the direction of the goal towards which commerce as a whole is moving. The direct

[1] See a paper by the author of this book on the subject of this paragraph in the *Journal of Geography* (Madison, Wis.) for December 1913, reprinted in the *Scot. Geog. Mag.* for June, 1916.

and immediate effect of high tariffs is, however, opposed to the tendency of the changes in progress referred to in paragraph **20**, and especially of the rapid multiplication of means of communication. When efforts of one kind are being constantly made to cheapen the supply of commodities it is scarcely credible that those who consume the commodities will always consent to have their price raised by an arbitrary barrier.

27. This last remark is made, however, solely from the point of view of commerce, and does not exclude the consideration that there may be other reasons for the imposition of tariffs in the interest of the state. The term **key industries** has recently been applied to such as it is considered essential for the good of the state to defend at any cost. In our own country agriculture and certain chemical industries, in particular the manufacture of those commodities which are required both for the manufacture of coal-tar dyes and of high explosives, are among those which since the war have come to be very generally considered as belonging to this class.

28. Export duties are not so frequently levied as import duties, although they are becoming more common. Obviously they can be levied only on those commodities in producing which the state levying the duties has by nature an advantage so great as almost to amount to a monopoly such as was enjoyed during the Middle Ages by England in certain kinds of raw wool, the export duties on which made up for centuries the great bulk of the revenue of the state.

29. Bounties—that is, payments made directly or indirectly on the exportation of goods—are another means sometimes resorted to by governments with the view of encouraging native industries; and with reference to these also it may be said that if it can be proved that a bounty has ever served to establish an industry capable afterwards of being maintained on a self-supporting footing, then a similar plea may be entered in favour of this aid to industry. One of the commonest forms of bounty now in use is the paying of a subsidy to certain lines of shipping (generally, however, in return for services in the carriage of mails or otherwise). The sugar industry (**432**) is the most important of those which have been affected by bounties in recent years. Great changes in the extent of government interference with trade by way of protective duties or bounties are, apart from war, perhaps the most deplorable, because the most arbitrary, of the disturbances of the commercial relations subsisting at any period.

30. The last edition of this work was published before the great war, and this was all that was said there on the **effects of war** on industry. But now we have more experience of those effects, though we are still[1] far from being able to gauge their full extent. They include immense destruction of life, which means labour power, and that at the period of greatest vigour; the impairment of the health of multitudes not directly engaged in the war; a great check to the birth-rate in the

[1] July 1920.

belligerent countries ; destruction of property of all kinds ; diversion to various destructive agencies of the labour normally devoted to providing for the future, especially by the creation of transport facilities, the erection of plant, and the manufacture of machinery ; the sudden redistribution of capital, involving, where that redistribution takes place within the state, the burdening for years to come of the bulk of the population with payments due to the smaller section of the people who form the state creditors, and, where that redistribution operates between state and state, changes in the relative advantages for production and commerce which may prove permanent. It is not out of place here to refer also to the mutual hatred and distrust between nations resulting from war, inasmuch as industry and commerce nowadays depend so largely on credit, which implies mutual confidence.[1] All these evils may be summed up as different modes in which war arrests that equalising process attributed to commerce in paragraph **10** and illustrated in the paragraphs there following, and removes the influence mentioned in paragraph **23** as favourable to foresight. Politicians, capitalists, captains of industry, and the workers are alike bewildered as to the situation, and it will probably be long before we know the new level from which rebuilding may start in conditions that give some promise of security for the future.

31. Further, governments assist commerce by maintaining officers known as **consuls** in the principal mercantile towns of foreign countries ; the officers so named being charged with the duty, not merely of looking after the interests of subjects of the country represented by them in the sphere of their consular districts, but likewise with that of furnishing such information as is likely to be of use to the merchants of that country. These reports usually furnish particulars as to the amount of trade carried on in various articles at the most recent date, as to the facilities of communication, shipping, and exchange ; descriptions of commodities most in demand, sometimes accompanied by samples of the goods themselves. The name consul is of Latin origin, and the present application of the title originated, with the practice of maintaining such officials, among the trading communities of Italy in the twelfth century. In the Austrian Empire there was an academy under the control of the Minister of Foreign Affairs for the education of candidates for the diplomatic and consular services. Being primarily intended for those preparing for service in the East, it was known as the Oriental Academy ; and the course of instruction embraced a legal training, military geography, and tactical science, as well as the teaching of 'Turkish, Arabic, Persian, Hungarian, French, Italian, English, Russian, Modern Greek, and Servian.'

32. British merchants and manufacturers have not the advantage of being able to consult British consular reports with reference to the

[1] See particularly the close of the article on 'The World Crisis,' by Sir George Paish, in *Ways and Means* for July 10, 1920.

extensive areas embraced by the British empire, but this want is met more or less in other ways. First, the self-governing portions of the empire maintain representatives under various titles, who make it part of their business to disseminate information likely to promote trade between the mother country and the dominions which they represent. Then, in the case of the other parts of the empire, the Colonial Office issues from time to time reports similar in their content to those received from consuls in foreign countries. Thirdly, in recent years the home government has appointed trade commissioners to various parts of the world, including those belonging to the empire.

33. The establishment of **chambers of commerce,** or voluntary associations of merchants in different localities, is now almost universal, and similar chambers are now getting established by merchants of different countries in foreign cities where a large amount of business is conducted. It is in keeping with modern tendencies that an Association of British Chambers of Commerce and an International Chamber of Commerce have now been formed.

34. Another method of promoting national commerce now coming into more and more general use all the world over is the establishment of commercial libraries and museums, the nature of which will be understood from an account of one of the largest and best institutions of the kind in Europe. That referred to is the State Commercial Museum at Brussels, the first of several erected in Belgium with the aim of furnishing Belgian manufacturers 'with the means of practically learning the articles of commerce preferred in various foreign countries, and the conditions under which such articles can be profitably exported.' The collection of articles exhibited in the museum has been selected with three objects: '1, exportation; 2, importation; 3, packing and preparation of samples.'[1] 'The classification adopted is not geographical, but by similarity of produce, apart from nationality. That is to say, that all goods of similar type (say linings) are juxtaposed, in order that manufacturer, merchant, buyer, and workman may compare the material, skill in weaving, price, dye, finish, and make-up of the merchandise of different nationalities. A manufacturer, say of blankets, is thus enabled to confine his inquiries concerning those textiles, and if he wishes for information in relation to them he rings an electric bell fixed in the case, which intimates to the attendant both who has called for his services, and the register which will be required. The numbers on the patterns correspond throughout with the registers containing data as to origin, price, duty, carriage, packing, season of sale, as also with the catalogue and the duplicates from which cuttings, for imitation, can be obtained.'[2] Exhibitions are a kind of temporary commercial museum, and floating exhibitions intended to convey samples of a country's commodities to various stations in distant

[1] *Cons. Rep.*, Ann. Ser. 76, p. 20.
[2] *Lond. Chamb. of Com. Journ.* 1886, Oct. Supp. p. 10.

markets are one of the latest means resorted to in different countries with the view of promoting national commerce.

35. In the United Kingdom there are as yet no general commercial museums, and at present samples obtained from consuls are sent to the chambers of commerce of the most important towns specially interested in the industries to which the samples belong. The **Imperial Institute,** founded in 1886 and placed on January 1, 1903, under the management of the Board of Trade, includes, among other things, a commercial museum of the products of the British Empire.

36. Technical education is another highly important means of advancing national commerce, and one which has also been hitherto comparatively neglected in the British Isles. A royal commission appointed to inquire into this subject issued a valuable report in 1884; and though the commissioners were able to refer with satisfaction to the benefits conferred upon industry by the more or less flourishing schools of science and art in London and nearly all the great industrial centres of the United Kingdom, they were obliged to admit that several foreign countries—notably Germany, France, Belgium, and Switzerland—were then as regards this branch of education in a much better position.[1]

37. Commercial education is another means of promoting national commerce of even greater importance perhaps than technical education, and in this respect Germany would appear to be at present admittedly ahead of all other countries. In the special schools of commerce which are found in nearly all the large towns in Germany, thorough instruction is given in the means and methods of business, in commercial geography, and above all in modern languages. The result was that for a time at least the German educated for business was on the average superior in all-round business capacity to his rivals belonging to other countries. With regard to the teaching of foreign languages in English commercial schools, it is probably the case that the fact of the English language itself giving the command of many of the best markets of the world has exercised a prejudicial effect on the desire to learn other languages; but it is becoming more and more manifest that this defect in English education will have to be supplied; and, in particular, it may be pointed out that without a knowledge of Spanish and Portuguese it will become increasingly difficult for English merchants

[1] Both British and foreign testimony make it doubtful whether this is still true. The following is Dr. Shadwell's summing up on this subject:—'While England has long been backward in technical education, it has of late years righted itself with so much energy that the provision from below [for the inferior grades of industrial employment] is already greatly superior to that of Germany, and the provision from above [for those who have the direction of industry] has at least equal potentiality if the same use is made of it. And that has begun.' *Industrial Efficiency*, cheap edition, 1909, p. 640. Similar testimony is borne as far back as 1903 by a German, W. Hasbach, in an article on British industry which appeared in the *Jahrbuch für Gesetzgebung, Verwaltung, und Volkswirtschaft* in that year (part ii.); see more particularly p. 66.

to retain their hold on the important and growing markets of South America.

38. An inevitable feature of war, especially war on a gigantic scale like that of 1914–18, is the extension of government control of industry, and even the direct participation of the government in industry. How much of that is to remain in this country after the war is still uncertain. On the one hand, it has to be kept in mind that such success as was achieved by the government in industry during the war was secured at the expense of the tax-payer, whereas industry must be able normally not merely to maintain itself by its own produce, but also to provide for its own growth. On the other hand, one cannot forget that for a long time the tendency in many parts of the world, and above all perhaps in some of the self-governing dominions of the British Empire, has been towards a great extension of the share taken by the state in industries of various kinds. In most of the colonies the railways belong to the state ; and indeed the private ownership of railways, as in the United Kingdom, the United States, and the Argentine Republic, is now rather exceptional. The Canadian government is an owner also of elevators and steamships, and ships for trading purposes are owned by other governments. The Queensland government carries on the business of timber-milling, trawling, insurance, cattle-rearing, and even keeps retail butcher shops. The constitution of the new German republic gives to the state not only the railways, but also the lignite and electrical industries. Our own government still hangs back for the most part from direct participation in trade and industry. Still it has been a large proprietor of shares in the Suez Canal since 1875, and during the war it became a partner in the Anglo-Persian Oil Co., and gave financial support to companies engaged in the manufacture of dye-stuffs **(608)**.

39. Several of these means of retaining and promoting commerce remind us forcibly of the closeness of the bonds with which commerce is steadily drawing different countries together, and of the **complicated action and reaction between different parts of the world to which commerce gives rise.** The improvement of machinery, of processes of production, of means of communication, the better organisation of industry, the advancement of education in one country, demand similar advances in other countries. New wheatfields in America necessitate improved systems of agriculture and the advancement of agricultural education in England, the introduction of better agricultural machinery into Russia. The perfecting of the processes in the refining of beet-sugar in Germany demands better organisation among the cane-planters of the West Indies and Guiana. The working classes more and more clearly recognise that any advantage secured for themselves in one country must be extended also to other countries. The United States consul for Dundee in his report for 1885 states that the longer hours worked in the Calcutta jute-mills were believed to be the determining cause of the depression in the jute industry of Dundee, arising from

the competition of Bengal; and he adds that both employers and employed were consequently anxious that the ten-hours-a-day Factory Act should be extended to India.[1] On the continent of Europe an agitation has been going on for some time in favour of international legislation on this subject.[2] And in connection with this attention should be drawn to the highly important suggestion made by Mr. Wardle of Leek in his report on the silk industry to the Royal Commission on Technical Education: the suggestion, namely, that 'trades organisations should encourage the display in all museums of fabrics, showing not only the quality, design, and colouring, but also every branch of detail as respects prices paid, and all costs of production.' 'This,' he states, 'while helping to steady the action of English trades' unions, would stimulate the operations and aspirations of similar bodies on the Continent.'[3]

40. It may perhaps be looked upon as one of the hopeful features for the future that the importance of the considerations set forth in the preceding paragraph is coming to be more and more clearly recognised, and that the more enlightened among both masters and men are becoming increasingly convinced that it is only by mutual and world-wide co-operation that some of the most perplexing problems of industry can find a solution. 'After all,' said the Rt. Hon. G. N. Barnes in a speech on the Treaty of Peace Bill in the House of Commons on July 21, 1919, 'hard conditions of life are not due to any conscious cruelty on the part of any class or any individual. They are rather due to fundamental causes which can be removed only by the co-operation of classes.'[4] Instances of the readiness on the side of capitalists to co-operate in this way, especially in the way of providing good housing and garden accommodation, are already too numerous to particularise. If one result of the great war should be that all countries came to realise that the healthiest conditions in the widest sense of the term for all engaged in industry were essential to the highest prosperity of industry, and all governments accordingly made it a prime aim to do what in them lay to secure such conditions as a permanency, we should all then be able to acclaim at least one good as issuing from that calamity. One is led to ask whether it is too much to hope that the labour clause (Article 20) in the Covenant of the League of Nations may in the end prove to be the most efficient instrument in bringing about that international way of thinking which is universally recognised as an indispensable condition of the success of the League. The proceedings of the International Labour Conference held at Washington in October–November 1919, followed by that on employment at sea held at Geneva in June–July 1920, are of good augury.

[1] *U.S. Cons. Reps.* 61, p. 418. See below, par. **1058**, *n.*

[2] *Ibid.* 50, p. 393. Early in 1889 the Swiss Government addressed to the manufacturing states of Europe an invitation to send representatives to a conference to consider the regulation of legislation for the well-being of the working-classes.

[3] *Report of Commissioners*, iii., p. lxxvi.

[4] *Hansard*, vol. 118, No. 99, col. 592.

Economic Statistics

41. One of the chief uses, if not absolutely the most important of all the uses of the study of Commercial or Economic Geography, is to enable us to form some reasonable estimate of the future course of commercial development, so far as that is governed by geographical conditions. Such an estimate must, of course, be based on one's knowledge of forces that can be seen in operation at the present time, and must be recognised as liable to be falsified by discoveries which it is impossible to foresee. The keenest and most widely informed have made forecasts which have proved to be utterly wide of the truth, but which could not be called unreasonable at the time. When Adam Smith wrote that 'the small quantity of foreign corn imported, even in times of the greatest scarcity, may satisfy our farmers that they can have nothing to fear from the freest importation' (*Wealth of Nations*, Book IV. Chap. II.), it was not expected that any one should be able to foresee the ultimate consequences of the inventions of the ingenious young instrument maker whom Smith had befriended at Glasgow. When Dr. P. Colquhoun in his *Wealth of the British Empire* (2nd edition, 1815) demonstrated the utter inutility of the new British colony in Australia, even that can hardly be pronounced unreasonable in the light of the knowledge of the time. Such forecasts may serve to remind us of the tacit qualifications with which all attempts to anticipate the future are to be interpreted, but do not show the inutility of making such anticipations as the circumstances admit of.

42. In attempting such forecasts statistical data are unquestionably an important aid. One of the greatest advantages which the future may be expected to have over the present will consist in the greater accumulation of statistical data, and greater insight as to the kind of data to be collected and the method of handling them. In Commercial Geography the value of figures is two-fold. First, they help at any particular time to distinguish the important from the unimportant. Second, when we have figures for a series of years they direct attention to changes that have been in progress in the past, and may thus serve to suggest the most fruitful branches of inquiry with reference to any geographical causes that may have contributed to such changes, and help us to estimate with more chance of success their probable action in the future. In both ways they serve as a guide to what is most worthy of examination in our special subject. In order that they may illustrate changes in progress it is obvious that the series are likely to be

the more instructive the longer and the more continuous they are, and the more numerous those series are which are directly comparable one with the other. In the first edition of this work the tables of the exports and imports of the United Kingdom went back as far as 1843 and 1854 respectively, the earliest years for which the necessary data could be obtained from the *Statistical Abstract for the United Kingdom*, but in a subsequent paragraph the reason is given for now starting with the period 1871–75. In the preface to the first edition the reason for adopting quinquennial averages is stated, and a warning is given as to one pitfall in the use of the tables, but some further explanations with regard to them are required.

43. The preface notes how misleading figures stating values may be in making comparisons between different periods even in the trade of the same country. With a view to removing this misleading tendency various index-numbers, as they are called, have been calculated, and the tables on pp. 710–711, extracted from an official publication, entitled *Statistical Tables relating to British and Foreign Trade and Industry* (1854–1908),[1] give some of the index-numbers for British trade calculated by the Board of Trade. The tables, however, require some explanation. For the individual commodities the index-number merely expresses the ratio of the average value of a given quantity of each commodity in a given year to the value which it would have had at the average price of the year (in this case 1900) which is taken as the base. Such index-numbers are not, however, index-numbers in the proper sense of the term, that is, numbers calculated to serve as an index of other numbers not definitely known. This is what is aimed at by the general index-number, which is based on the average price of forty-five commodities, all articles largely consumed, such as wheat or wine or raw materials, but including such raw materials as bricks and hewn fir ; but in working out the general index-number these forty-five commodities are not allowed to count equally, but are weighted or multiplied by different numbers in different cases, the weight allotted in the general Board of Trade index-number being the estimated value in millions sterling of the annual consumption of the article, generally during the period 1881–1890. It is assumed that the numbers so obtained when used as multipliers of the figures giving the total value of that trade will serve as an index of the variations of the total quantity of that trade.

If then those forty-five commodities may be taken as illustrative, the general index-number will thus serve to show how far values have been affected by some cause or causes having a wide-reaching influence, and the variations in the index-numbers for the individual commodities when compared with the general index-number will be the means of indicating how far some special cause or causes must have affected their fluctuations in value. It should be noted that the base year 1900 was

[1] [Cd. 4954] of 1909.

quite arbitrarily chosen, and is not to be looked on as a year of 'normal' prices. It was in fact a year in which prices were considerably inflated by the South African war.[1]

44. Whatever be the cause of changes in index-numbers, the facts underlying those changes modify, and sometimes to an important degree, the significance of the values given for exports and imports. For example, if we take the periods of five years for which the average value of imports into the United Kingdom from 1871–75 to 1906–1910 is given on p. 702 we find that there is only one, namely, the period 1886–90, which shows a decline in value as compared with the previous quinquennium—in round numbers £390 against £400 millions. But if we apply the Board of Trade index-number, base 1900, to these figures the values become changed to £333 millions in 1881–5 and £379 millions in 1886–90, showing an increase in the latter period of nearly 14 per cent. instead of a decrease of about 2½ per cent. Now with an index-number calculated as explained, this shows that during the latter period considerably more supplies of food and raw materials must have been coming into the country than in the one before. That being so, we may be sure that those increased supplies would find their way into the hands of consumers. Stocks are not kept on indefinitely in the hope of better prices. Perishable goods cannot be. So far as the increased imports, then, were food-stuffs, they must have been a direct benefit to the consumers; so far as they were raw materials, increased supplies must have helped to maintain the demand for labour, for they were imported in order to be used, and manufacturers still found their advantage in using them in spite of the fact that they did not see their way to sell the products at former prices. It is not even a necessary consequence that the lower selling prices of the products meant lower profits to the manufacturers. 'The exports of a manufacturing country,' observed Sir Robert Giffen, 'may be nominally affected by a change in the value of the previously imported raw material, although there is no real change in the native produce exported, or when the real change may be the opposite of the nominal one. Say that one-quarter of the exports consists of previously imported raw material, then a decline of 50 per cent. in the value of the raw material would produce a decline of 12½ per cent. in the aggregate export, which would be entirely nominal. If at such a time the exports were apparently stationary, the real fact would be that they had increased 12½ per cent., or rather about 17 per cent., allowing that the increase really takes place on three-fourths only of the nominal total.'[2]

45. Further, when these tables are used for making comparisons of the trade of different countries one may be led into error in various

[1] The still greater inflation of the great war having brought into relief the defects of former index-numbers, the Board of Trade adopted in 1921 an index-number on a new principle, an account of which is given by Mr. Flux in the *Journal of the Royal Statistical Society*, vol. lxxxiv., pp. 167–99 (March 1921).

[2] *Journ. of the Stat. Soc.*, vol. xlv. (1882), pp. 197–8.

ways. First, it is important to remember that such returns for the same country do not always refer to the same economic unit. When accessions of territory are gained by any country there is likely to be a change of this nature. Thus in former editions of this work Chilean statistics were given from 1874–75, but the cession of the provinces of Tarapacá and Tacna by Peru in 1883 renders these incomparable with present day figures. The notes necessary to prevent errors from this cause are given on the individual tables. Next, it is to be noted that there is no uniformity in the nature of the total given for the trade of a country, whether the commerce referred to be designated general or special. Under the name of general commerce all articles imported and exported are included, but under the head of special commerce only goods imported for home consumption and goods of home production exported are supposed to be reckoned. But this is far from being uniformly true. Very generally goods that enter into circulation in the country free from the control of the customs are taken as part of the special commerce of the country. This is so, for example, in Germany. Now in the tables of German trade for 1911 raw cotton, caoutchouc, and rice appear among the special exports to the aggregate value of more than £6,000,000, although obviously none of these is a product of Germany, and we cannot tell how great may have been the value of other re-exports when the goods are of such a nature that they may or may not have been German products. In our own country, on the other hand, no attempt has been made to distinguish goods imported for home consumption, but a distinction is always made between exports of native origin and manufacture, whether free goods or goods subject to customs duty, and goods of foreign and colonial origin. Note, however, that goods that have undergone the slightest manufacturing operation, such as colonial wool combed in Great Britain, are included (rightly) among the goods of British manufacture. In two points, however, our tables are misleading or inadequate from causes which perhaps cannot be remedied. The general tables are exclusive of what is called transhipment trade, of which a separate statement is made. Formerly one was led to infer that this was a statement of commerce that came to British ports on through bills of lading for ports outside of the United Kingdom, and in former editions of this work it was expressly stated to be so, but from the fuller information now given it appears that this is not the case. The transhipment trade is exclusively of articles imported and exported in bond, and may include, actually does include, a considerable amount of trade on British account, that is, the import of goods bought by British merchants and resold by them abroad. The trade in free goods on through bills of lading is now also the subject of a separate statement, but this trade is also included among the general imports and exports of articles of foreign and colonial origin. It thus relates to commerce which forms indeed part of the business of

British ports, but may not be British in any other respect. It would, for example, include trade in Australian wool bought in Sydney on account of a Hamburg merchant, sent to London in a French sailer, and thence despatched to Hamburg in a German vessel.

46. Statistics of external commerce usually include statements as to the description of the goods exported or imported, the quantities, the countries of origin or destination of the goods, and the value. In the case of many articles, and especially those most largely imported and exported, such as food-stuffs and raw materials, the description of the article presents no difficulty, so that one may deal with returns as to such commodities in making comparisons between period and period in the trade of the same country, or between different countries for the same or different periods without fear of being misled. But in many cases it is otherwise, and difficulties in making comparisons for the same country for long periods are constantly being made by tariff changes necessitating different classifications, and even where there are no tariff changes alterations in the classification of goods are often made simply with the view of giving a more satisfactory statement of the facts of commerce. However useful such changes may be from one point of view, it has always to be remembered that they have the drawback referred to. This drawback arises, it should be added, even when increased care is used, and hence increased accuracy arrived at in the collection of the original data.

47. Notes are also given on the individual tables as to the various practices in stating the countries of origin and destination. In some cases the practice with regard to values has been, and in one case still is, even more misleading than any of the practices that have prevailed with respect to the point just mentioned. In England the earliest attempts at the systematic collection of commercial statistics appear to have been made in 1697. From that time down to 1797 inclusive the values entered for English commerce and, after the union of the Parliaments in 1707, for that of Great Britain, were official values based on the prices of 1694 and for new articles on the price of the first year of their introduction. The so-called values were, accordingly, not true values, but for each commodity served to give indications of changes in quantity from year to year, while the totals had little meaning at all. From 1798 in the case of exports declared values were added, not substituted, so that we have the absurdity in Porter's *Progress of the Nation* [1] of two tables giving professedly the same thing, the value to the last pound of exports from the United Kingdom from 1801 to 1849, yet utterly divergent from one another, showing from 1820 onwards a steadily growing excess of official over declared values till in 1849 we have

Official Value	£164,539,504
Declared Value	63,596,025

[1] Edition 1851, p. 356.

In the case of imports computed values, that is, values officially estimated in accordance with what were believed to be the current prices of the time,[1] were introduced, and remained in use till 1870 inclusive, but from 1871 onwards declared values have been entered for imports also. This, observed Mr. (afterwards Sir Robert) Giffen, 'should warn us all to use a great deal of caution in carrying our comparisons of import values farther back than 1870.'[2] It is for this reason that the tables in the Appendix are now made to begin with the period 1871–5. It should be added that according to British practice import values are those at the port of arrival, that is, include freight but not merchant's profit, export values those at the port of shipment, 'free on board' (f.o.b.). Notes are given on the different tables as to the mode of valuation adopted by different countries, but it may be worth while to call attention here to the peculiarities of practice in Denmark and the United States. Denmark has for imports official values based on the prices of the goods in the exporting country with the addition of the cost of conveyance to Denmark, and for exports values based on the market price in Denmark with the addition of the cost of conveying the goods to their destination. Unlike the export values of other countries, accordingly, Danish export values are c.i.f. values, that is, are values including cost, insurance, and freight. While the Danish practice thus differs from what is otherwise general in the case of exports, it is very important to note that the practice of the United States is singular under the head of imports, the import values are based on the market value or wholesale prices in the exporting country, that is, do not include freight. In the case of exports the values for native goods are the declared values at the place of shipment, for goods of foreign origin if taken from a warehouse the values at the place of import, otherwise the values at the time and place of shipment.

48. My attention has only recently been called to the fact that in the commercial statistics of the Netherlands the use of official values such as were formerly employed in this country is still maintained. The figures on which the value of imports and exports of that country in the tables in the former editions of this work were based were taken, like those of other countries, from the *Statistical Abstracts for Foreign Countries*, where no warning is given as to their nature. It appears, however, that the 'values' in Dutch returns are based on the prices of 1860 or thereabouts. For that reason the tables that in earlier editions professed to give the value of the trade of the Netherlands have been deleted as worthless, and others have been substituted which will serve to indicate how great the divergence now is between the so-called values of the Dutch returns and the approximate actual values.[3]

[1] For detailed information as to the methods of computation see a paper by Mr. Stephen Bourne in the *Jour. Statist. Soc.*, vol. xxxv. (1872), p. 206.

[2] *Jour. Stat. Soc.*, vol. xlv. (1882), p. 188.

[3] It will be observed that in one case, Peruvian bark, the so-called value is more than seventy times what may be taken to be near the true value.

49. No student of commercial geography can be unaware how many subjects there are that still await investigation, and in many cases how far the means for obtaining the desired information are lacking. This deficiency is felt in a peculiar degree with regard to the trade and more particularly the home trade of our own country, but in all countries one has often to regret that the available data refer to the country as a whole instead of particular regions which it would be desirable to investigate. It may be useful to conclude this introduction with the enumeration of a few subjects for research, but for the reason just mentioned the labour involved in procuring the necessary data for the investigation of some of these subjects might in some cases be so considerable as to render it impracticable for the present to arrive at any satisfactory conclusions :—

How far British rule in different parts of the world has contributed to the growth of the trade of foreign countries.

The relation between fluctuations in different meteorological conditions and the yield of various important commodities. The occurrence of frost, snow, hail, and fog, and the precise seasonal distribution of rainfall (see **64–68**, and p. 608, n. 2) and sunshine (**356–62**) may all have to be taken into account.

The conditions of commercially successful and unsuccessful irrigation.

The trade between countries of the temperate zones as contrasted with that between the temperate and torrid zones.

The advantages of rural and urban centres for different kinds of manufacturing industry.

The effect on commerce of the construction of particular railways.

The difference in the nature and volume of traffic resulting from the substitution of railways through mountain tunnels for cart or sumpter traffic across mountain passes.

The relation of seaports to their hinderlands.

The influence on commerce of the possession by different countries of bulky commodities such as coal, timber, salt, ice, cement, wool, grain, and the like.

The distribution of ocean traffic between sailers and steamers.

The significance of changes in the value of imports and exports per head of population.

The effect of local labour, local supplies of raw material, and local markets in the development of manufacturing industries.

The ultimate destination of the bulk of the produce of particular districts, distinguishing home and foreign markets and the particular parts of foreign countries which form those markets.

The exhaustibility of natural advantages for any particular kind of production, as evidenced by a rapid followed by a slower expansion of a local industry concerned in such production.

The effects of government interference in modifying the influence of natural advantages.

Friction in the transference of labour skilled and unskilled from one producing region to another.

Changes in the character of the emigration to regions to which there is a large flow of immigrants.

The gradual conversion of manufacturing industry from the lower to the higher branches.

GENERAL FACTS RELATING TO THE PRODUCTION, DISTRIBUTION, AND EXCHANGE OF COMMODITIES

I. Climate. Underground Water and Temperatures

50. Under the head of climate we have to consider here only the main climatic factors affecting the production and distribution of articles of commerce. The commodities whose production is most immediately affected by climatic conditions are those derived from the vegetable kingdom; but those of animal origin, being directly or indirectly dependent on vegetation, are subject to the same influences. It is, however, climate as influencing vegetation, and more particularly as influencing cultivation, or the bestowal of human labour in promoting vegetation, that we have to keep chiefly in view in considering the effect of climate on the production of commodities.

51. For all kinds of vegetation there is required a certain amount of **heat** and a certain amount of **moisture,** the laws regarding the distribution of which over the globe are explained in text-books of geography. In the present work it is enough to call to mind a few leading facts.

52. The great source of heat is the sun, and of moisture the ocean, where evaporation is brought about through the heat of the sun. The winds, however, are the carriers both of heat and moisture, so that it is essential to study the direction of the prevailing winds in order to understand the distribution of temperature and rainfall over the globe. **Temperature** decreases on the whole from the vicinity of the equator towards the poles, but the rate of decrease is very unequal over land and water. Water being more slowly heated and cooled than the land, the diminution in temperature towards the poles is more rapid over the ocean than over the land in summer, less rapid in winter. The vicinity of the ocean for this reason has an equalising effect on the temperature of adjacent lands, but this effect is brought about solely by the agency of the winds. With reference to land temperatures accordingly it is more important to consider the direction of the prevailing winds than the mere distribution of land and water. Winds depend on local differences in the pressure of the atmosphere. They tend to blow from regions of high pressure to regions of low pressure. Regions of low pressure occur over the warmest parts of the ocean near the equator, and in the interior of the great land-masses in

summer, when they are most directly exposed to the rays of the sun. Over the ocean the region of high temperature and low pressure forms a belt, towards which winds blow more or less from the north and south. The direction of these winds is, however, modified by the rotation of the earth, in consequence of which these winds, known as the **trade-winds,** blow more or less from the east, in some parts of the Pacific almost directly from the east, as, for example, where, in the language of Sir Thomas Browne, 'sailing from Lima to Manilla . . . you may fasten up the rudder and sleep before the wind.' It is important, therefore, to observe and constantly to bear in mind that over a great width of the ocean in low latitudes extending on both sides far beyond the tropics, there is a strong tendency for the winds to blow away from the west sides of the continents and towards the east sides of the continents. The position of this wide belt, or rather of the two wide belts separated by an intermediate belt of calms corresponding to that of lowest pressure, is not constant. It moves north and south with the sun, along with the whole system of atmospheric pressures dependent on the height of the sun above the horizon. Wherever and whenever the trade-winds blow, however, they have a certain effect in mitigating the temperatures of the regions exposed to them.

53. Outside of the trade-wind region there is normally in the winter months an area of low pressure in the North Atlantic to the north of 60° N., and in the North Pacific a similar area more to the south. Towards each of these the winds tend to blow, but in consequence of the rotation of the earth not directly, but in great spirals in which the direction of movement is opposite to that of the hands of a watch. Hence south-westerly, and consequently warm, winds prevail at this season on nearly all the west coasts of Europe and a large part of the west coast of America, while northerly, and hence cold, winds prevail on the opposite coasts, that is, on the east coast of North America, and the east coasts of northern Asia. The contrast between the temperatures of these coasts in corresponding latitudes is another great fact constantly to be borne in mind, as well as the fact that the benefit of the relatively high winter temperatures is carried by the winds a greater or less distance inland. Warm ocean currents flowing in the same direction as these winds blow help to maintain their temperature, but it is to be observed that without the winds these currents would have no effect whatever on the temperature over the land. In the summer months the area of low pressure still exists in the North Atlantic, so that in that period also south-westerly winds prevail, though not so strongly on the west European coasts. In the North Pacific during the summer months an area of low pressure can scarcely be said to exist. In the southern hemisphere outside of the trade-wind belt the conditions are greatly altered by the fact that the amount of land is very small. It is enough to say that there the

prevailing winds throughout the year, at least to the south of 40° S., are westerly.

54. The influence of the pressure of the air over the land in determining the direction of the prevailing winds is most marked where there are great bodies of land to the north or south of seas in lower latitudes, above all in eastern Asia and in Australia. The interior of eastern Asia in summer is a region of very low pressure, in winter of very high pressure. Hence, in summer ocean winds, south-westerly, southerly, south-easterly, blow over all the south-east of Asia, including the islands, from the Indian peninsula to about the parallel of 60° N. During the winter land-winds, north-easterly, northerly, north-westerly, prevail in the same region. These are the **monsoons,** which have an important effect on temperature as well as on rainfall. The summer winds, though blowing from lower latitudes, do not tend to raise the temperature, because they come from the ocean; but the winter winds being land-winds as well as coming from higher latitudes have a marked effect in lowering the temperatures, more particularly in the temperate zone. For this reason also the winter temperatures in the east of Asia are much lower than those in corresponding latitudes in the west of Europe and Africa, a fact of great importance in commercial geography. In Australia similar results are due to the alternation of high and low pressures in the interior, but owing to the difference of hemisphere the seasons and the directions of the winds are reversed.

55. In consequence of the facts stated with regard to the prevalent winds, there is, in the temperate zones, and more particularly in the northern hemisphere, a general lowering of the mean temperature of the year from west to east, due chiefly to an **easterly increase in the cold of winter,** and partly compensated by an easterly increase in the heat of summer. The increase in the extremes of heat and cold is greatest in the eastern or broader of the two great land-masses, and the **coldest region of the earth** (so far as explored) lies towards the east of Asia, some distance inland, since the sea everywhere has some effect in mitigating extremes of temperature. While the eastern land-mass thus exhibits greater cold and greater contrasts of summer and winter temperature in the east of Asia than are presented in the east of America, its western or European portion, being exposed to warmer winds traversing a warmer ocean than those which visit the western coasts of North America in high latitudes, is characterised by a more equable climate and higher winter temperatures than corresponding latitudes on the latter coasts; and, in general, we find that when we compare equal latitudes in the west of America and the west of Europe, the latter continent shows the higher temperatures; but when we make a similar comparison for the east of America and the east of Asia, the higher temperatures are found in America.

56. By way of illustrating these great general facts by means

of others having more bearing on the production and distribution of mercantile commodities, it may be mentioned that the **northern limits of various cultivated plants** whose range is somewhat rigorously determined by climate, such as the orange (284) and the vine (291), are higher in Europe than in the west of North America, but lower in the east of Asia than in the east of North America ; that whereas the whole of the west coast of Norway, extending to beyond 70° N., is at all times free from ice, the northern coasts of the peninsula of Alaska, in about 57° or 58° N., are regularly beset by ice in winter ; but, on the other hand, whereas the eastern coasts of North America are rarely encumbered by ice below the Gulf of St. Lawrence, in about 46° or 47° N., ice is to be seen in the Chinese Gulf of Pechili below lat. 40° ; and, again, Halifax, in Nova Scotia, in 44½° N., is nearly always open, and thus can serve as a winter-port for the Canadian Dominion ; while the Russian seaport of Vladivostok, in the east of Siberia, to the south of 43° N., is closed by ice for about a third part of the year. With regard to cultivated plants, however, it must be mentioned that those which are able to profit by long and hot summer days during a very short summer can be grown in higher latitudes in eastern Asia than in eastern North America. Wheat, rye, barley, and even cucumbers, can be grown at Yakutsk in eastern Siberia, in 62° N. (the same latitude as the mouth of the Yukon in Alaska, and Frederikshaab in Greenland), the barley and wheat being sown in the first days of May, and ripening about the middle of July—within two months and a half.

57. The land surfaces of the **southern hemisphere** are too narrow to exhibit the easterly increase in the extremes of temperature, especially since they do not extend into those latitudes in which that increase is most marked. One circumstance is, however, noteworthy regarding the climate of the temperate zone of the southern hemisphere, namely that it is generally colder, at least on the land, than in corresponding latitudes of the northern hemisphere ; so that the limit of cultivation of various plants is in a lower latitude to the south than to the north of the equator. A glacier descends in Chile to the water's edge in about lat. 46° S., a latitude corresponding to that of the middle of France in the northern hemisphere. The orange is not cultivated for its fruit in Victoria, except in the extreme north-west, in a latitude one or two degrees below that of the southernmost point of Europe. In the South Island of New Zealand, which is in as low a latitude as the northern half of Italy, oats is the principal crop, as it is in Scotland and Ireland.

58. As the winds are the carriers of heat and cold it follows that the physical configuration of the land may indirectly affect temperature. Mountains, by obstructing winds, in some cases afford protection from cold winds, in others prevent certain districts from getting the benefit of warm ones. Temperature is also greatly modified by evaporation and condensation of water vapour, evaporation always tending to

bring about a lowering and condensation a rise of temperature.[1] Heat is lost during the night by radiation, and since there is greatest loss of heat in this way where the atmosphere is dry, clear, and rare, there are great extremes of heat by day and cold by night in the interior of continents, especially at high elevations. Low temperatures prevail at high altitudes, but it is to be remembered that these low temperatures are those of the air. There is no diminution, but the reverse, in the strength of the rays of the sun on any body directly exposed to them.

59. It is important that students of economic geography should be clear in their minds as to the meaning of the diminution of mean temperature with altitude. This is not a phenomenon observable equally at all times of the day and year. A statement as to the rate of that diminution, usually given as equal to about 1° F. for every 300 feet of ascent, expresses the result of averaging differences of temperature in a vertical column of air or in adjacent vertical columns, at different times and in different situations, and in a great many cases it is of much more practical importance to observe that at certain times in certain situations the difference is the other way, the lower temperatures at the bottom, the higher on the upper slopes or even on mountain tops. This will be understood when it is borne in mind that various causes are at work affecting air temperatures. First it should be noted that the air is heated principally not by the direct rays of the sun, but indirectly through the warming of the surface of the earth, which then imparts its heat in various ways to the air above. Naturally, therefore, when the surface of the earth is warm, the air is all the warmer the nearer it is to the surface, and this difference is all the greater on account of what occurs in connection with one of the modes of conveying the heat from the ground to the higher strata of the air, namely, by means of convection currents. The air nearest the ground expands in consequence of its greater heat and so becomes relatively light and rises. But as it rises it becomes subjected to less pressure and expands still more, and this expansion is accompanied by an instantaneous lowering of temperature permeating the whole mass. As long as the air rises and there is no condensation of the water-vapour in it into cloud, rain, snow or any other form of water, this cooling goes on at the rate of 1° F. for every 180 feet of ascent, a figure which does not express an average but states a fact observed with every rise of air, whether by day or night, in summer or in winter. The rate of cooling, however, is checked when any condensation takes place.

60. But if the heating of the air above takes place from the ground

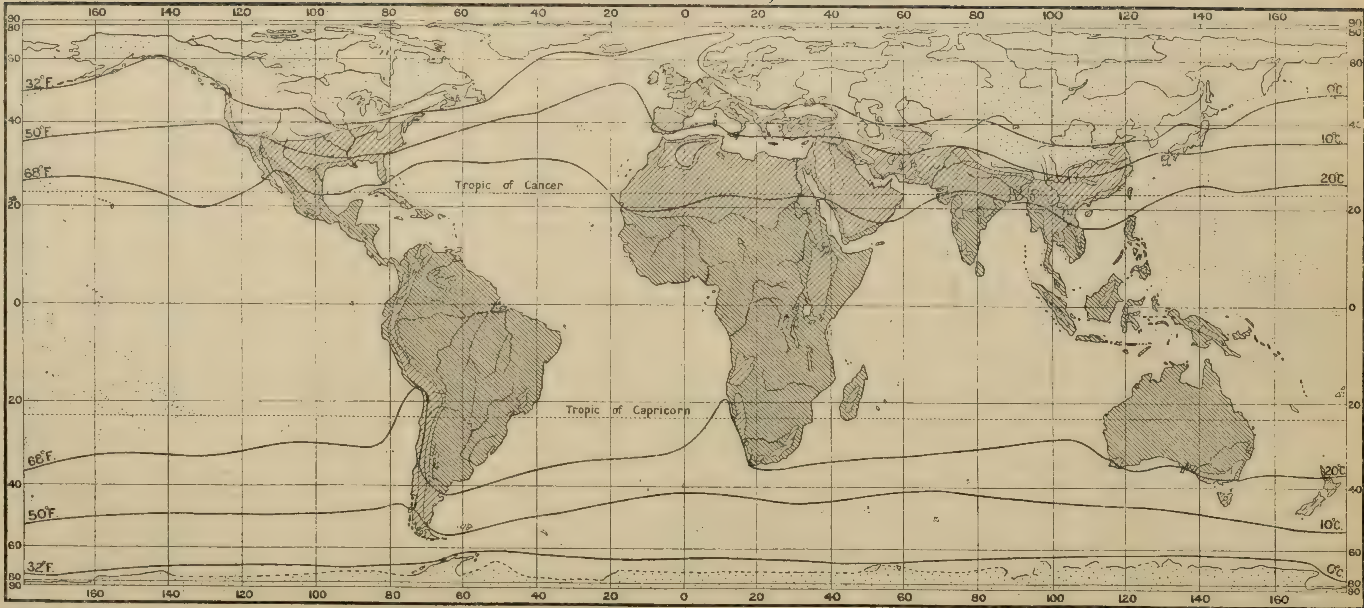
[1] The conversion of water into vapour, like the conversion of ice or any other solid into the liquid state, involves the expenditure of heat. That is, heat (in the scientific sense of the term) is used in the conversion, and is not available for raising or maintaining temperature. Meanwhile, of course, temperature may be maintained, and even raised, by external supplies of heat (as from the sun, or a fire).

upwards, so also in a large measure does the cooling at night. At night indeed every part of a column of air loses heat by radiation upwards into space, and the higher strata lose heat in this way most rapidly on account of the greater rarity and frequently also the greater dryness of the atmosphere. But the ground loses heat in this way, above all on clear nights, much more rapidly than any part of the air column, and that brings about a more rapid cooling of the air near the ground. The adjacent stratum is cooled by actual contact. The strata immediately above that are cooled by a more rapid radiation of heat downwards to the ground than upwards into space. The result is that, at the coldest part of a summer night, there is a regular increase of temperature from the ground upward, a so-called inversion of temperature, at least up to the height of more than 2,000 feet above the ground, whereas the diminution of temperature in the same direction at the hottest period of a summer day may be equal to about 2° F. for every 300 feet of ascent. Such are the variations that are expressed in the mean diminution stated in the previous paragraph.

61. From this account it will be understood that the lowering even of the mean temperature with altitude will differ according to the nature of the superficial configuration. Isolated peaks, exposed on account of their isolation to ascending winds from all directions, will show a much more rapid rate of diminution than mountainous country in which a large extent of the solid crust is raised to a high altitude. Where we have an extensive high level tableland, or even high valleys out of reach of ascending winds, air several thousands of feet above sea-level may be as near the ground, that is, as near the heating surface, as air above a plain only a few feet above sea-level, and the high ground in this case will be more intensely heated than the low ground by sunrays falling at the same angle on both. In such a case the only circumstances that bring about a lower mean temperature at the higher altitude are the greater rarity and generally also the greater dryness of the atmosphere. These conditions prevent the air from taking up heat as rapidly from the ground by day and favour a more rapid cooling by night. The total lowering of the mean temperature, however, is reduced to a minimum. Hence it is that it is possible to cultivate wheat in western Canada in the same latitude as Snowdon at as great a height as the top of Snowdon. At Banff, Alberta, at the height of about 4,600 feet, considerably higher than the top of Ben Nevis, the author observed larkspurs, campanulas, sweet-williams, stocks, pansies, and marigolds all flourishing on a warm September day, and on the same day at Lake Louise, about 5,700 feet above sea-level, crowds of eschscholtzias in bloom, besides asters and other flowers.

62. The facts just mentioned cannot but suggest that it is difficult to attach any clear meaning to isothermal lines drawn through maps representing land with varied physical configuration, based on observed

ACTUAL TEMPERATURE, JANUARY



Projection - Behrmann's Equal-Area.

Above 68°F. 50° to 68°F. 32° to 50°F. Under 32°F.

Over the lands the isotherms reduced to sea-level are continued as thick lines, and the actual temparatures are indicated by shading.
After Herbertson - Geographical Journal, Vol. XL p. 522.

ACTUAL TEMPERATURE, JULY

Projection - Behrmann's Equal-Area.

Bartholomew Edin.

Above. 68°F. 50° to 68°F. 32° to 50°F. Under 32°F.

Over the lands the isotherms reduced to sea-level are continued as thick lines, and the actual temperatures are indicated by shading

After Herbertson - Geographical Journal, Vol. XL p. 523.

mean temperatures reduced by a common multiplier to so-called sea-level temperatures, and at any rate will serve to bring home to every one that what we have to do with in economic geography is not sea-level temperatures but the temperatures actually observed, and it is these that are taken into account in the accompanying maps, based on those of Professor Herbertson illustrating his paper on *The Thermal Regions of the Globe*.[1] The isothermal lines drawn over the sea on two of those maps serve to indicate the great differences of temperature on different coasts in the same latitudes. The map showing the duration of the period, with a mean temperature over 50° F., affords some indication as to how the temperature requirements of vegetation suited to the temperate zone are met, but it must be kept in mind that it does so only very broadly. It is not on mean temperatures even as actually observed that vegetation depends, but upon the actual temperatures experienced within a range that differs for different plants. Still such a map is as instructive as it can be made for general purposes.

63. Differences in the range of temperature which different plants will stand make it important to observe the conditions in which exceptionally low temperatures are liable to occur on low grounds as compared with higher slopes. As heated air expands and rises so cold air contracts and sinks. In calm weather the air on mountain sides gets cooled by night more rapidly than on the valley bottoms. The radiation upwards is more rapid on account of the greater rarity of the air, and it starts from a lower temperature than at the valley bottom. Hence the air on the slopes becomes so heavy that it flows down the mountain or hill sides to the valley bottom, and there accumulates if there is no adequate outlet for it. Hence it is that, for example, in the choosing of sites for orchards in regions subject to low temperatures, the lie of the ground must be carefully studied. One must see that there is good air drainage, a free way of escape for descending cold air. Above all one must avoid 'frost-pockets' or hollows in which cold air might accumulate like water in a lake. Where mountain valleys, in parts of the world with severe winters, are shut off from the prevailing winds, the mean winter temperature is lower in the valley bottoms than higher up, and the celebrated Austrian meteorologist and climatologist, Hann, has pointed out that in such valleys in the Alps the human settlements for that reason are found on the hill sides, not in the lower parts of the valleys. For the same reason, in parts of the Appalachian mountains cultivation is mainly confined to what is known as the thermal belt, high enough up to escape the extreme regions of winter. It is on the slopes of the hills, not in the valley bottoms, that wheat is grown round Yakutsk (**56**) and in the upper Angara.

64. As the great source of **moisture** is the ocean, for the most part

[1] *Geographical Journal*, vol. xl., pp. 518–29.

the further inland a region lies the less chance has it of receiving an ample rainfall, unless there are special conditions favourable to the condensation of water-vapour. Water-vapour is condensed through the more or less rapid lowering of the temperature, and one of the most frequently operative causes in bringing about that reduction of temperature is the presence of mountains, obstructing moisture-laden winds, and thus forcing them to ascend and become cooled by expansion. Consequently regions on the maritime side of mountains often have a sufficient rainfall when those on the other side have not. In the tropics there is generally a more marked distinction between rainy and dry seasons than in most parts of the temperate zone. This distinction is most marked of all in the **monsoon regions,** in which the winter winds are naturally for the most part dry winds, whereas those of the summer months come heavily charged with moisture and bring about a very high rainfall in the parts more directly exposed to them. In these regions accordingly we have the combination of heat and moisture specially favourable to vegetation, and this characteristic is particularly noticeable in the parts of the monsoon areas belonging to the temperate zone, which are in consequence greatly more productive than regions in the same latitudes elsewhere.

65. The important matter of the distribution of rainfall throughout the year is illustrated by the four seasonal rainfall maps[1] and the diagrams on p. 36. In studying the maps of seasonal rainfall it should be kept in mind that seasons of heavy rain are also seasons of flood, and that even the normal floods of many regions with a high seasonal rainfall add greatly to the cost of road maintenance, and may render roads useless for long distance travelling by making the dry season fords impracticable. With the diagram illustrating the monsoon type of rainfall may be compared in the first place those for places in the trade wind belt. The curves in the diagram of places on the east side of continents in that belt are all typical. During the summer months the areas of low pressure which are then found in the interior of continents have the effect of strengthening the trade-winds that tend to blow on the east side, which accounts for the marked preponderance of summer rain indicated by the diagram. On the east side of such regions accordingly we have a repetition of the combination met with in the monsoon areas. The rainfall curves in the diagram for places in the trade wind belt on the west side of continents illustrate the variety of effects due to physical configuration and outline rather than the characteristic rainfall distribution of those regions. In those regions it must be remembered that the tendency for the winds to blow away from the land is partly counteracted during the summer by the areas of low pressure in the interior tending to set up an indraught from the west. That indraught is, however, mostly feeble, and the

[1] After Supan's maps accompanying the paper on *Die Verteilung des Niederschlags,* forming *Ergänzungsheft* No. 124 to *Petermanns Mitteilungen.*

rainfall is consequently so scanty, except in very low latitudes, that those coasts are almost unpeopled, one consequence of which is that there are no rainfall stations to furnish typical curves. The curve for Mazatlan, however, shows that in exceptional cases this indraught may have a great effect in promoting a high summer rainfall. Mazatlan is situated near the Tropic of Cancer on the west coast of Mexico at the base and on the exposed side of high mountains with reference to Pacific winds. In the summer there is an area of low pressure to the north, establishing monsoon conditions the effect of which is shown in the high rainfall at that period.

66. The **Mediterranean type of rainfall** presents a complete contrast to the monsoon type, for in all those regions where that type obtains the rains occur in winter. All the regions so characterised lie on the west side of the great continents on the outer margin of the trade wind belts, in such a position that they may be described as lying behind the trade winds in summer, although exposed to cyclonic storms in the winter. In summer, however, the ocean winds in the neighbourhood of those regions tend to blow away from the land, and those blowing landwards, that is, from the west, are therefore feeble, do not come from a great distance, and are not heavily charged with moisture. The most extensive of all the regions having this character is that which gives its name to the type, and which, as may be seen from a comparison of the seasonal maps for December to February and June to August, stretches eastwards over Asia Minor, to the mountains on the north-west of India ; but, extensive as it is, it may be fairly described as lying on the west side of the great land-mass or double continent of Europe and Asia. In that region, moreover, the direction of the summer winds is greatly affected by the existence of the highly super-heated area of the Sahara lying to the south. The same maps show that the other areas characterised by this type of rainfall are California, central Chile, the extreme south-west of Africa and Australia, and in a less marked degree the part of South Australia round Adelaide. All such areas must be less productive on the whole than corresponding latitudes in monsoon regions.

67. The continental type of rainfall outside of the strictly monsoon areas is partly due to conditions similar to those which bring about the monsoon rains. The great rarefaction and consequent low pressure over the land during the summer favours the penetration of sea winds far into the interior at that season ; and any causes that may then tend to bring about a sudden rise of moisture-bearing air, or in any other way to effect a rapid cooling of the atmosphere, are then apt to lead to a fall of rain. In the extensive regions so characterised, however, there is neither the great quantity of rainfall usual in the monsoon regions nor the same degree of difference between the summer and winter rainfall as in those areas in which the monsoon characteristics are most distinctive. Still, even if the preponderance

DISTRIBUTION OF MEAN RAINFALL IN THE FOUR SEASONS After Alexander Supan
WINDS FROM BARTHOLOMEW'S "ATLAS OF METEOROLOGY"

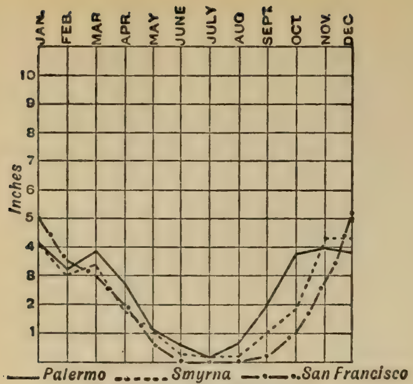
Bartholomew, Edin.

of summer over winter rains be slight, it is in many cases important to vegetation and cultivation as supplying the rain when it is most needed. But this rule is not universal. Crops like wheat which thrive with winter rains can be grown with a scantier rainfall when the preponderance of the precipitation is in winter. There is then less loss of moisture by evaporation, and the moisture is more or less stored up in the soil in readiness for the spring growth, and by proper cultivation the proportion so retained in the soil may be partly increased **(101–102)**.

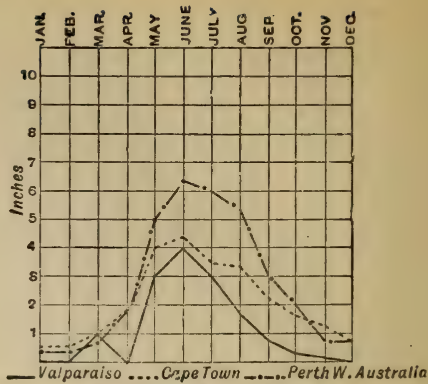
68. It will be seen from the rainfall maps that in the high northern latitudes the total precipitation of the year is very scanty, but in those regions it is not the scanty precipitation but the temperature conditions that are unfavourable to vegetation, with the exception of a few specially adapted types such as mosses and lichens. The summers are short and cool, and the ground at a small depth below the surface, in some places to within a depth of three feet, is perpetually frozen, causing the upper stratum in summer to be almost uniformly marshy, except where the slope is sufficient to allow of drainage. Scarcely anywhere beyond the parallel of 50° N., except perhaps in a limited area on the confines of Asia and Europe, is cultivation restricted solely from the lack of the necessary rain. For even in the heat of summer the high temperature of the soil leads to the ascent of currents of air, and these carry up with them moisture that soon reaches a level at which it is again liable to become condensed. Bright days with not infrequent showers consequently characterise the summers from European Russia to the east of Siberia, to the north of the limit named. South of the parallel of 50° N., on the other hand, there are both in the Old World and the New vast areas which are desert or nearly desert from excess of drought, except perhaps in the neighbourhood of mountains which promote the condensation of water-vapour, or of rivers which supply water for irrigation **(96-99)**.

69. The tropical regions of the earth are those in which on the whole the amount both of heat and moisture is greatest. It is there also that as a rule temperature is most uniform all the year round, so that, where moisture is sufficient, there is a constant succession of vegetation, and trees may bear fruit at all seasons. Moreover, it is in these regions that cultivation ascends highest on mountain slopes and plateaux, all the crops of different climates being capable of cultivation at different heights on tropical mountains. All these circumstances would appear to be favourable to the production in large amount of articles of value in commerce, and hence to the maintenance of a vast trade between temperate and tropical climates. But the fact is otherwise. The circumstances unfavourable to the production of commercial commodities in the tropics far more than outweigh those which have just been mentioned as favourable to that production.

70. In the first place, where the rainfall is plentiful, the very luxuriance of the natural vegetation, forming dense forests almost

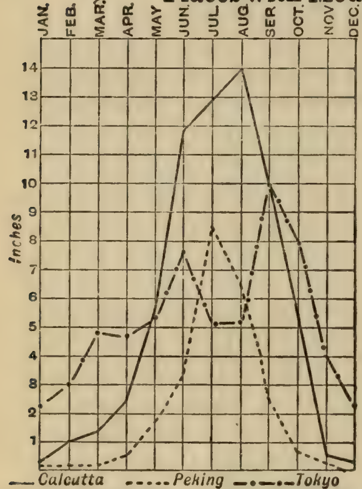


Northern Hemisphere

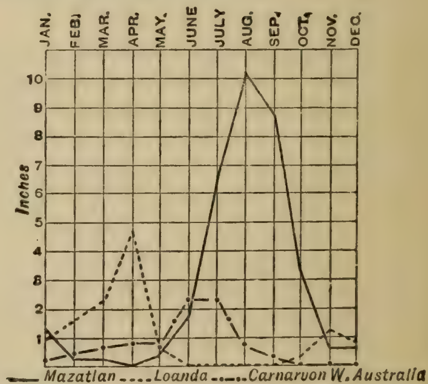


Southern Hemisphere

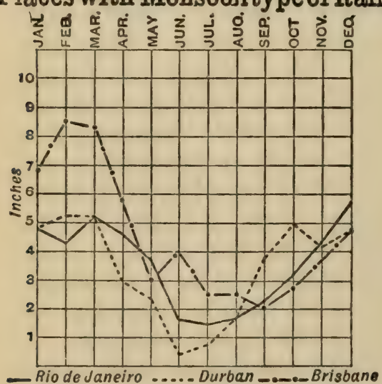
Places with Mediterranean type of Rainfall.



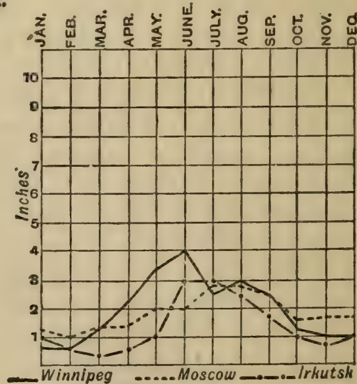
Places with Monsoon type of Rainfall.



Places in the Trade wind belt on the west side of Continents.



Places in the Trade wind belt on the east side of Continents.



Places in North Temperate zone with continental type of Rainfall.

TYPICAL RAINFALL DIAGRAMS.

impenetrable by man, not to be cleared without the most strenuous labour, and ready to spring up again in all their former vigour and exuberance wherever cleared ground is exposed to neglect, presents an obstacle to cultivation such as is seldom met with in temperate climes. Further, excess of rain is for the most part prejudicial to the production of those parts of plants which are of most importance for human food. It washes away soluble fertilising ingredients of the soil, more particularly such as are needed for the formation of the fruit, especially fruits rich in proteids. Tropical luxuriance is mainly luxuriance of the vegetative parts. In addition to teak and other furniture woods, jute, rice, bananas, and sago are the only products of the rainier parts of the tropics that enter largely or even considerably into world commerce. Wood and jute as articles of commerce are purely vegetative products, and the constituents of sugar and oil, which are more abundantly produced in warm than cool climates, are entirely derived from air and water (**89**). Of the foods mentioned, rice is the only one that contains a fair proportion of protein, the tissue-building element of food, about 8 per cent. as compared with from 11 to 13 or 14 per cent. in wheat flour. But the yield of rice per acre compares unfavourably with that of wheat in the temperate zone, and the comparison is still more unfavourable to rice in proportion to the labour expended on the crop. According to the *Imperial Gazetteer of India* the average yield of a transplanted crop of rice in good soil is 2,400 lbs. of paddy.[1] But paddy is unhusked rice, and according to the same authority[2] clean rice is only about three-fifths of the quantity of paddy, so that in clean rice the yield is only about 1,440 lbs. Still lower estimates are given for the average in Burma,[3] and if higher estimates are given in certain cases these are admittedly exceptional, and could be fairly compared only with exceptional yields of wheat. The first estimate given is avowedly one for tolerably favourable conditions, and it is not therefore unfair to compare it with the wheat-yield in New Zealand, where soil and climate are no doubt favourable, but where there is not the high farming of an old country. Now, on the average of the ten years 1900–1 to 1909–10, the wheat-yield of New Zealand was equal to about 1,900 lbs. per acre. Some waste must of course be allowed for in milling, but much of the loss in milling is largely a matter of habit. Many think that in eating only the fine flour we lose as food some of the best of the grain, and even when not used as human food the refuse of milling serves as food for domestic animals. Then, as regards the labour expended on the crop, the estimate given above applies to transplanted rice, that is, rice first sown in a seed-bed from which the plants are transferred individually to the rows in which the crop ultimately grows. Where this is not done the weeds are apt to get the start of the rice and smother it. And that is only one of the laborious operations in connection with rice cultivation. As for

[1] Vol. iii., p. 29. [2] Vol. vii., p. 245. [3] *Ibid.* vol. ix.

bananas and sago, their deficiency in protein makes them quite incomparable with European food-grains as articles of diet. Though Humboldt, no doubt thinking of a wheat-yield in Germany, perhaps only a third of that of the present day, declared that the area which planted with bananas would support fifty human beings, would support only three if sown with wheat,[1] and Wallace estimated that with ten days' labour a man might produce from the sago-palm food enough for the whole year,[2] there is no doubt that the diet in both cases would be very inadequate, and it is enough to point out that nowhere in the world is there a dense population sustained by either the one food or the other.

71. Secondly, one has to bear in mind that there are vast areas of the tropics in which little or no rain falls, regions which are either desert from drought or covered with only a scanty herbage, so that they would reward but poorly the labour of cultivation. Such regions lie either where mountains occur to cut off the ocean moisture from plains and plateaux in the interior, as in the heart of Africa and Australia, or where the prevailing winds carry the moisture away from the land, as on parts of the west coasts of Africa and America (**66**). In such regions, however, the absence or scantiness of rain is not everywhere due solely to the small quantity of water-vapour in the atmosphere, but largely to the fact that the hot air over the burning plains can retain so much moisture in the form of invisible vapour, and hence on cold clear nights the herbage is often refreshed by plentiful deposits of dew. Thirdly, even when all else is favourable, the climate is of such a nature as to render the inhabitants disinclined to labour. The excessive heat and moisture are enervating, and cause steady labour to be peculiarly irksome even to natives, whose simple wants, moreover, are, at least in some cases, so abundantly supplied by nature, that there is not the same motive to exertion as is presented in other lands. The following picture of native life in the tropics of South America (the United States of Colombia) may be taken as typical to a large extent of tropical life elsewhere :—

'In the country a man can locate his house in the woods, without fear of disturbance, erect the same in one day from the wild growth surrounding him, and soon have a clearing made in which he can grow three crops of corn [maize] in a year. He must not plant more than his children can protect, however, from the wild parrots and animals which like cultivated food. The plantain and banana produce within eight months of the seed, and thereafter without much care yield a continual harvest. The yam and yuca, a species of potato,[3] yield quickly, and are very hardy. Sugar-cane once planted is always present. With these products growing around him, and the river near

[1] Quoted in Leunis, *Synopsis der Pflanzenkunde*, 3rd edition, by Dr. A. B. Frank, vol. ii., pp. 769–70.

[2] *The Malay Archipelago*, London, 1890, p. 292.

[3] In reality the tuber of a plant belonging to the same genus as manioc, the shrub that yields tapioca (**423**).

to supply him with fish, the native is happy, depending for his meat upon the wild animals he can kill with spears made from the lance-wood of the country, or which he can entrap. . . . His only necessity for money is to provide salt, rum, tobacco, clothes, and the machete, or long knife, which he uses for every purpose, from picking his teeth to cultivating his lands. The money is gained by working for some rich neighbour, by cutting wood for the river steamers, and catching and drying fish for the city markets, or by cultivating the ground in excess of his own requirements.'[1]

72. From the causes indicated **population in most parts of the tropics** is **relatively scanty**, and **commercial products**, such as coffee and sugar, are **mainly grown under the direction of Europeans,** or people of European origin (as in India and Ceylon, Java, Brazil, and Guiana). Many of them are the products of hill slopes at a greater or less elevation, such sites presenting combinations of soil and climate not to be found elsewhere. While the temperature is more moderate than on the low grounds, it has all the uniformity characteristic of the tropics, and the slopes of tropical mountains exposed to warm ocean winds enjoy frequent and copious supplies of rain, combined with the advantage of excellent drainage, so that there is little fear of their roots suffering from excess of moisture. The only danger to be guarded against is the possibility of the soil being washed away from the roots at the same time.

73. To Europeans the residence on tropical hills is perhaps more healthy than residence on the low grounds in the same latitudes ; but even at the elevation at which coffee is grown, a tropical climate is for them neither healthy nor agreeable.[2] The enervating effects of the heat and moisture render them unfit for work such as they could engage in with comfort in more temperate regions ; and notwithstanding the uniformity of the temperature as indicated by the thermometer, the unpleasant sense of heat often alternates with as unpleasant a sense of cold, for the excessive moisture of the atmosphere renders one sensitive to variations of temperature which would be scarcely felt in a drier climate. Humboldt mentions in one place that he and his companions, after a short residence in the torrid zone, found that their senses had become so easily affected by the slightest change of temperature that they could not sleep for the cold on one occasion, even when they discovered, to their astonishment, that the thermometer indicated a temperature equal to 71° Fahr. An African traveller mentions that on the Senegal one could not expose oneself in the open air after sunset to a slight lowering of temperature without feeling

[1] On the whole subject of the alleged fertility of the tropics, see a most instructive article by Prof. Sapper, of the University of Strassburg, in the *Geographische Zeitschrift* for 1912, pp. 305–17, 387–401, or the admirable summary of that article in the *Scot. Geog. Mag.*, Dec. 1912.

[2] See, however, the views expressed by A. R. Wallace in his *Studies, Scientific and Social* (1900), vol. ii., chap. v., entitled ' White Men in the Tropics.'

the sensation of decided cold. In central Africa, within ten degrees of the equator, the natives keep themselves warm at night by spreading the mats that form their bedding on hollow clay benches heated by fires or glowing charcoal inside, just as is done in China.

74. In the **temperate zones** not only is the temperature on the whole lower than within the tropics, but the variations in temperature are generally greater. As far as the more productive parts of the earth are concerned, it is chiefly in the temperate zones that **frosts** occur, and water-vapour is precipitated as **snow**. A snow-covering of longer or shorter duration is a regular annual occurrence in higher latitudes (from about 40° or 46° N., according to the locality), except in those western tracts which are most directly exposed to the warm winds from the south-west. The deepest snows in cultivated regions are those which occur in the eastern provinces of the Canadian Dominion, where snow lies on the ground to a depth of from three to five feet **(1246)**. Both **snow** and **frost** may be regarded, on the one hand, as interruptions to field labour. Frost is also an interruption to communication by closing navigable rivers, and snow by blocking railways. On the other hand, snow favours timber transport and sledge-travelling. In regions of scanty rainfall it is in many parts of the world extremely important as a natural store of moisture for summer use, especially on mountain slopes, and all the more if forests are present to prevent its removal by gravitation. Elsewhere this store may result in injury by flood. Both snow and frost, moreover, must be recognised as beneficial to the soil, and hence favourable to cultivation. Snow, from being a bad conductor of heat, though it tends to preserve rigorous temperatures in the air above, protects the underlying soil against these rigours, and, when the time of melting arrives, saturates the ground with moisture, which brings vegetation rapidly forward. **Frost,** again, by expanding the water in freezing in every pore of the soil to which it reaches, pulverises the soil to an extreme degree of fineness, and thus enables the coming vegetation to send its rootlets to a great depth, and obtain in consequence all the greater nourishment.

75. With regard to the effect that the climate of the temperate zone has upon production indirectly through its influence on man as the producer, it may be said, in general terms, that such influence is the opposite of that exercised by the torrid zone. While not so productive as to make little demand for the labour of man, that zone yields enough in return for labour to serve as a stimulus to exertion, and the change of the seasons, and especially the regular recurrence of winter, braces the nerves and tends to make labour agreeable. Different parts of the temperate zone have their compensations. The warmer regions, though, with equal advantages in other respects, more productive than the colder, are less stimulating. Even the coldest regions of the temperate zone in which cultivation is possible at all are more favourable to health and activity than the countries belonging to the tropics, and are

far from being so unpleasant an experience as one is apt to represent them in the imagination. For these regions are not only the coldest, but in winter the driest in the world. The winter air in central and eastern Siberia is drier than the air of the driest desert, and with such dryness of the atmosphere fur clothing and a thin tent for a roof are all that is necessary to enable one to pass the night in comfort, even when the temperature is one at which mercury can be chopped into pieces and hammered like iron, at which iron axes are readily shattered like glass, and at which green wood becomes as hard as iron. Lung diseases in such a climate are unknown. Similar accounts are given of the healthiness and comparative pleasantness of the Canadian North-West.

76. Whether in the tropics or the temperate zone physical exertion at a high altitude has an injurious influence, though the effect is different in different individuals. What is known as **mountain sickness** affects all who are subjected to hard muscular work above 10,000 feet. On the Oroya railway (1855) the time during which riveters were engaged did not average a week each. Many returned on the next train. Animals suffer in the same way.[1] The cause appears to be a diminution in the supply of oxygen, bringing about an increase in the relative pressure of the carbon dioxide in the lungs, and thus a stimulation of the respiratory system. That may, on the other hand, be also the explanation of the favourable influence experienced by some at lower altitudes. Captain Gill in his *River of Golden Sand* speaks of the peculiarly exhilarating effect enjoyed by him at an altitude of about 6,000 feet. Residents in Alberta at altitudes between 3,000 and 4,000 feet have spoken to me of the stimulating effect of that region on their appetites as compared with their original British homes. These beneficial influences are readily explicable by a quickened respiratory action in the case of those whose hearts have the necessary vigour.

77. In connection with the subject of climate may be considered **underground water-circulation** and underground temperatures, inasmuch as both of these depend more or less upon climate, and both have to be regarded in some cases as influencing man directly or indirectly in the same way as climatic conditions. Everywhere at a greater or less depth water is present, saturating loose earth to the exclusion of air. The upper surface of this water-saturated layer, the level of which is indicated by the surface of water in wells, is known as the water-table, and its depth below the surface is determined by the amount and mode of precipitation and the rate of evaporation. The amount of water that penetrates to a sufficient depth to feed this layer varies according as the precipitation is in the form of fine or heavy rain, or of snow or hail, and according as the melting of snow or hail takes place when the ground underneath is frozen or not. The circulation of this underground water depends on the porosity of the rock and the slope of the

[1] *Geographical Journal*, vol. xlvi., p. 91.

water-bearing strata, which may differ greatly from the surface slope. It is from this underground water that springs are derived. In many places matters dissolved in the upper layers of soil are carried down a short depth and, being redeposited, cause the formation of a hard layer known as **hard-pan,** which the roots of plants do not penetrate at all or only with difficulty. Where the soil lies horizontally this hard-pan may form vast underground sheets, such as those known in the Landes of south-western France as *alios*, in the plains of N. Germany as *ortstein*.

78. Surface temperatures penetrate only to a slight depth. Daily variations in temperature cease to be observable at a depth of about three feet, and even the yearly variations are perceptible at most to a depth of 80 to 100 feet. The depth at which they can be detected is least in the tropics, about twenty feet, where the annual range of the surface temperatures is least, and greatest in the interior of the continents, where the corresponding range is widest. Below the level of this layer of constant temperature the **temperature underground** steadily increases at a rate that varies somewhat with different circumstances, among which the conductivity of the rocks is prominent, but is calculated to be on the average at about 1° F. for every 60 feet depth. This is the cause of the variation in the temperature of spring water, that coming from the greatest depth having the highest temperature, and generally, therefore, the greatest abundance and variety of mineral content. Most medicinal springs are hot springs. The result of the small depth of the layer of constant temperature in the tropics is that spring water there is never refreshingly cool but always at temperatures of from 68° to 72° F. On the other hand, in Iceland, where there are low equable temperatures and there is consequently a layer of constant temperature near the freezing point close to the surface, the spring waters are so cold that instead of being allowed to irrigate the fields they have to be carefully led away from them, as their effect would be disastrous. The increase of temperature with depth below the surface has a great effect in mining operations and in tunnelling under high mountains. Men cannot work for any considerable time in dry air when the temperature is above 120° F., or in moist air when it is above 105° F., or even less. Now at Edinburgh a temperature of 105° might be expected at a depth of less than 3,500 feet, one of 120° at about 4,350 feet. This latter depth is one that is attained by the Victoria Quartz mine at Bendigo in Australia, and there are other mines nearly 4,000 feet in depth elsewhere, but it is only by the most careful ventilation that the working of such mines is practicable, and even then the mortality is very great. In the moist air of the Alpine tunnels great difficulty was met with in carrying on the work even at temperatures of 90° F., and the piercing of the Simplon tunnel would have been impracticable but for the cooling due to the expansion of the compressed air which was used to drive the boring tools.

II. The Soil and its Treatment

79. The soil exercises an influence on vegetation in various ways. In the first place, it supplies a portion of the food of plants. It supplies also substances which may not be themselves converted to any great extent into vegetable tissue, but which serve to carry about the food-stuffs from one part of the plant to another, or to effect the necessary changes on these food-stuffs, from whatever source they may be derived. And, thirdly, the nature of the soil affects the life of the plant by the effect it has upon the temperature of the roots, or other parts of the plant embedded in the ground; for some soils are more readily heated than others, and more readily give up their heat to bodies in contact with them.

80. Soils differ from one another in two classes of characters, physical and chemical, both of which are of importance to the vegetation belonging to them. Physically, soils differ from one another in the condition of their particles. They may be coarse or fine, porous or compact and tenacious. Other things being equal, the fine soils are more fertile—that is, supply food more plentifully to the vegetation living upon them—than the coarse; for all the food which plants derive from the soil enters the small rootlets dissolved in moisture, and the finer the earthy particles the more easily are the necessary substances dissolved. This is one reason why the soil of deltas is almost invariably remarkable for its fertility, for such soils are made up of the finer sediment carried along by a river. The advantages or disadvantages of porous soils as compared with those which are compact and tenacious vary according to circumstances. One advantage porous soils nearly always have—that of being light and easily worked by the plough or spade. They are also easily permeated by water, and thus readily permit rain to sink into them, instead of running in great part off the surface, and at the same time favour the rise of moisture from great depths, by the action of capillarity (the action by which liquid diffuses itself through a lump of sugar). But this may be an advantage for certain plants or in certain climates, and a disadvantage for other plants and in other climates. It is a disadvantage to plants that require the retention of a great deal of moisture about their roots; and while it may be, and generally is, an advantage in climates in which showers are frequent and the atmosphere moist during the growing season, it is a disadvantage in climates of an opposite character, where it is of

importance for the plant life that the moisture in the soil should be long retained within reach of the roots—that is, that it should neither sink away to a great depth, nor rise up too rapidly and quickly evaporate, thus giving the plants the benefit of the moisture for only a short time.

In moist climates porous soils are generally, in virtue of the superior dryness of their superficial layers, more easily warmed than heavy and compact soils, and that not only because water requires a greater amount of heat to raise its temperature to a certain degree than any solid substance, but because of the loss of heat by evaporation (**58**). Hence light porous soils are generally described as dry and warm, and those of the opposite kind, like clays, as wet and cold. Soils may be so compact as to prevent the access of air to the roots and hence infertile from that cause.

81. So great are the natural differences in respect of chemical composition that, to take wheat as an illustration, the soil of one region may yield a crop of 50 or even 70 bushels to the acre, whereas that of another yields, with a climate equally favourable, no more than 12 or 15 bushels, or perhaps even less. The composition of the soil often varies very greatly from local causes within limited areas ; but there are, on the other hand, many wide regions noted for being covered with a soil either characteristically rich or characteristically poor. Everywhere, it ought to be mentioned, the soil is due to the crumbling away of solid rock more or less modified by the vegetable, and even the animal, life that comes to occupy it. Large deltas are generally remarkable for their fertility, not only, as above indicated, in consequence of their physical nature, but also because they contain ingredients derived from the whole basin of the river by which they are formed, and hence are likely to contain all the constituents which a variety of plants require as food. For a similar reason, great alluvial plains like those of the Ganges and the Po are generally remarkable for their fertility, and so also are the beds of former lakes, such as the basin of the Red River of the North, in the United States and Canada.

82. Vegetable mould, or humus, the product of decay of vegetable matter, mixed with earthy (mineral) constituents, forms a soil of great fertility, rich in carbon and nitrogen. A moist soil, however, hinders the intermixture of the vegetable remains with the earthy particles and causes the formation of what is called acid humus, of which peaty soils are the most familiar example. The moisture of such soils is not readily taken in by the plant tissues, and hence those soils are adapted only to a special kind of vegetation of a dry woody habit like heaths. In some places humus is formed very abundantly in tropical forests, where vegetation is continuous, and the accumulation of vegetable waste proportionately rapid. But it is not readily formed in all tropical forests. If the climate has long dry spells and the forests are rather open, the falling leaves dry up, get hard and crisp, and are easily

broken by the wind, so that their elements are dispersed in the form of gases. To this cause is ascribed, in a great measure, the infertility of a large part of Brazil. Where there is a regular winter accumulation of snow, this covering has, among other important effects, that of burying the fallen vegetable matter and saturating it with moisture so as to favour the formation of vegetable mould. The action of earthworms in promoting the formation of a soil rich in this ingredient, by covering the surface deposits with layers of earth brought up from beneath, has been made a matter of almost universal knowledge by the well-known work of Darwin.[1]

83. Many lavas or rocks originally poured out from the interior of the earth in a liquid state decompose into a soil of exceeding richness. Soils of this kind form some of the most fertile tracts, not only in Java and Japan, Campania and eastern Sicily, and other regions where there are volcanoes still active, but in many other regions where there have been no volcanoes within historic times. Among the latter are soils covering considerable areas in Hungary, and the much more extensive tract which forms a large part of the wheat-growing area of Oregon and Washington in the United States, the tract occupying both sides of the Columbia River, where the soil results from the decomposition of a broad basaltic plateau, and the coffee soils of S. Paulo in southern Brazil, due to the disintegration of diabase rocks rich in potash and other fertilising ingredients. In some cases, so rapid is the decomposition of lava, that some of the vineyards on the slopes of Mount Vesuvius occupy lava fields which came into existence within the nineteenth century.

84. Among other soils noted for their fertility occupying extensive areas in different parts of the world may be mentioned the black soil of southern Russia (**910**) and central Asia (**1017**), the yellow soil of northern China (**1093**), and the black soil of the Indian plateau, which last differs from all the others previously mentioned in being exceedingly stiff and heavy, and owes a large part of its fertility to its being so peculiarly suited to the character of the climate where it is found (**362**).

85. The soils known as **laterites**, from being of a red colour like

[1] It is singular that the anticipation of Darwin's observation in a book so popular as Gilbert White's *Natural History of Selborne* should, apparently, be so little known, and that Darwin himself should have forgotten White's remark. The passage referred to occurs in Let. LXXVII (edn. of Capt. T. Brown, 1833; Let. XXXV in the edn. of E. T. Bennett, revised by J. E. Harting, 1875), where we read :—' Earthworms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For . . . worms seem to be the great promoters of vegetation . . . by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves into it; and, most of all, by throwing up such infinite numbers of lumps of earth, called worm-casts, which, being their excrement, is a fine manure for grain and grass.' For a remarkable illustration of the beneficent action of earthworms in the Yoruba country, see *Proc. R.G.S.*, xiii. (1891), pp. 584–5.

the dust derived from pounding red bricks (Lat. *later*, a brick), are characteristic of tropical and sub-tropical climates, being due to the extremely rapid decomposition of the rocks under the influence of rapid changes in temperature, and excessive, though, it may be, only occasional, rainfall. They owe their red colour to the presence of iron, and when fully formed iron and alumina remain as the chief constituents. The lime, potash, and magnesia which may have been contained in the rocks from which they are formed all disappear, and in the high temperatures of the tropics even the silica gets dissolved and washed away, frequently being redeposited as a cementing substance in underlying sands. When the process is thus carried out to its full extent such soils are absolutely worthless, but this takes place only in exposed situations where the rainfall is very high. But the term laterite is freely applied to many red earths in which the solvent action has not gone so far, and which, accordingly, vary in their properties, some being fertile, others not. If the term is applied generally to the red earths of the tropics, then laterites have been estimated to cover 49 per cent. of the area of Africa, 43 per cent. of that of South America, and 18 per cent. of that of Asia. But this estimate includes under the head of laterites the red soil which is found to be particularly favourable to the coffee tree on the slopes of the mountains of eastern Brazil, south of Rio de Janeiro. In many parts of Africa the infertility which characterises this soil is due rather to its physical than its chemical characters. The solution of the silica has proceeded only so far as to coat the particles of earth with a thin glaze, giving rise to a soil so porous that the rain runs through it very readily, and as such soil is found in that continent over wide areas to a great depth, in those parts the soil dries up with remarkable rapidity, unless refreshed with frequent showers.

86. The soil of arid regions is in many cases chemically very rich, so that when water is supplied the ground is exceptionally productive. For this there are two reasons. The soil is largely wind borne and is hence collected from wide areas, and for that reason is likely, as already stated, to possess a great variety of ingredients. Second, such vegetation as does grow naturally in those regions produces an exceptional growth of the underground parts, and those parts of a plant are always richest in nitrogen. Hence, though the soil from the scantiness of the vegetation may be comparatively poor in humus, its nitrogen content is not correspondingly feeble, and may be considerably in excess of that found in humid areas.[1]

87. In the arid or drier parts of the earth the soil is frequently highly infertile, and even poisonous to vegetation, from the excess of salts found on the surface, due to the fact that the moisture which does penetrate beneath the ground dissolves the salts in the earth, and then, rising up again and evaporating, leaves the salts as an incrusta-

[1] See E. W. Hilgard, *Soils*, p. 137.

tion behind. Vast areas of this description are found in the interior of Asia and south-eastern Europe, of Australia and South America, while smaller tracts of the same nature exist here and there as patches amidst the fertile regions of California and the Canadian North-West, where they are known as 'alkali spots.' The formation of such salt incrustations is one of the risks attending irrigation.

88. PRESERVATION OF THE PROPERTIES OF THE SOIL. But, however rich a soil may be by nature, sooner or later its fertility will be impaired by cultivation unless means are taken to prevent this deterioration. The substances that serve as the food of one crop are removed when that crop is carried away and consumed elsewhere, and as the same kind of plant always requires the same kind of food, the fertility of a soil is in general reduced very rapidly when the same crop is grown repeatedly on the same land, and when nothing is done to restore the ingredients that are thus removed. Under a careful system of cultivation two plans are adopted to counteract this tendency of the soil to lose its fertility. One is to vary the crops that are cultivated in succession on the same piece of ground, which spares the land in two ways. First, since different plants withdraw from the soil different substances as food, or at least varying proportions of the same substances, a crop requiring chiefly one kind of food is made to follow a crop which requires chiefly another kind. Secondly, it is not always necessary to remove from the ground the whole of the cultivated plant, and the parts of the plant not required may be returned to the ground, and help to restore to it some of the ingredients required not only by this crop but by crops of other kinds.

89. Obviously, however, this method is an imperfect one, and the only way to maintain permanently the fertility of the soil is to restore by **fertilisers** the ingredients that are withdrawn by successive crops. But here it must be noted that the quantity of matter that has thus to be returned to the ground is small in comparison with that which is carried away as produce of the soil, even though the plant-food contained in the manure is generally a small proportion of the bulk of the manure itself. It has been found by experiments made in England in the cultivation of wheat that the use of 200 lbs. of a particular kind of manure made a difference of nearly 600 lbs. in the weight of grain yielded by an acre of land, as compared with a piece of land, of the same extent and the same natural qualities of soil, that had borne wheat without manure nine times in succession; and this difference, it will be observed, does not take into account the weight of straw and other parts of the crop. The reason of this is, that though all plants derive some of their nourishment from the soil, and the amount of their produce is generally more or less governed by the amount of nourishment obtainable from that source, yet in all cases the chief constituents of plant-food are derived either from air or water.

90. Small as the total proportion of plant-food derived from the

soil is, the constituents of such food are very varied; but the three essentials to plant-growth most likely to be lacking in cultivated soils are nitrogen, phosphoric acid, and potash, and hence manures containing these substances are most important as articles of commerce. All three are contained in animal excrements and in animal refuse of various kinds, and these, accordingly, are generally the most convenient manures to apply to the ground, where mixed farming, part crop-growing and part cattle-feeding, is carried on. It had long been known that leguminous crops such as clover, lucerne, beans, peas and lentils not merely required no nitrogenous manures but even served to replenish the soil with soluble nitrogen for subsequent crops, but an important stimulus to the cultivation of such crops for use as green manure was given by the discovery in the eighties of last century that this was due to the fact that bacteria present in nodules on their roots and rootlets served as the means of fixing nitrogen derived from the air. The name of **commercial fertilisers** is given to various compounds, nitrates, phosphates, and potassic salts, or mixtures of these, artificially prepared, containing the above-mentioned ingredients along with others, as well as to natural compounds which are found in deposits of greater or less abundance in various parts of the earth, and are worked as minerals, though originally they may be to a large extent of vegetable or animal origin (**571·11**). These enter into world-trade to the amount of millions of tons annually,[1] exclusive of the still larger quantities at least of nitrogen and phosphorus compounds that become available after first being employed as feeding stuffs.

91. Of the artificial fertilisers the bones of animals variously treated are among the most important. Being to a large extent composed of phosphate of lime, they are of great value as manure, not only on account of the phosphoric acid which they contain, but also on account of the nitrogen always present, and still more because of the **lime** itself; for though this latter substance is not so important as phosphoric acid as a plant-food, it is often of the highest importance as a manure from the fact that, by bringing about certain chemical changes, it helps to make the constituents of plant-food which are present in the soil available to the vegetation. For, seeing that, as already stated, all the elements which a plant derives from the soil enter the rootlets in a state of solution, no constituent of plant-food is of any use to the plant unless it be first dissolved; and among other uses which lime has as a fertiliser this is one of the most important, that it is one of the best materials that can be employed for the sake of imparting solubility to substances otherwise insoluble. (See **490.**) For use as manure bones are in some cases merely ground into a coarse meal, in other cases steamed so as to remove most of the

[1] Between 1903 and 1913 the world's demand for nitrogen compounds increased from about two to about five million tons (Final Report of the Nitrogen Products Committee, Cmd. 482).

nitrogen but to leave a high proportion of phosphorus, and in other cases treated for the same purpose with sulphuric acid so as to produce what are known commercially as superphosphates, although in the manufacture of these mineral phosphates are now principally used. Since 1886 a fine meal or flour obtained by grinding basic slag, which contains from 30 to 35 per cent. of phosphate of lime (**535**), has become more and more used as a phosphatic manure. Sulphate of ammonia (**608**) forms a valuable nitrogenous manure, and since the early part of the present century various nitrogen compounds have been made from the air for the same purpose (**612**).

92. Notwithstanding the manifest advantages of the adequate use of manure in maintaining the value of the soil, its employment in sufficient quantity to ensure the preservation of a high degree of fertility is far from being general. Manure is, as a rule, but little used, first, where the population is sparse, and, secondly, where the population is poor. The United States and India may serve to illustrate these two cases. Where the population is sparse land is cheap, and the cultivator may find, and usually does find, it more profitable, at least for the present, to derive as large crops as he can from the ground without manure, and begin to cultivate new ground when the first shows signs of being exhausted. Moreover, where the population is scanty, there are for obvious reasons fewer opportunities of obtaining animal manure, which in regions possessing a dense population is the kind most readily available. In the United States, accordingly, what we find is that the use of manure has gradually spread westwards, following in the wake of cultivation. The eastern states, which were those first cultivated, were in the beginning cultivated without manure, and as these lands became partly exhausted, others farther west became the chief regions of agricultural production ; but at the same time, as the population, from the development of commerce and industry, thickened in the eastern states, the use of manure to restore fertility to the fields of that region became more and more general. About 1883 the use of manure was stated to have reached the longitude of Ohio, and to be beginning in Indiana, and even in Illinois.[1]

93. In India, again, though the population is dense, manure is probably even less used than in the United States ; but the principal reason of this is that the employment of manure, besides always involving a certain amount of expense, does not yield its full benefit in the way of increased produce in one or two crops. However necessary it may be, therefore, to maintain the fertility of the land, costly manures cannot be used where the cultivators are too poor, as most of those of India are, to be able to wait and look forward to future years for the reward of an outlay on their farms. 'In many districts [of India] the

[1] Even at the close of the nineteenth century it was stated by Mr. B. W. Snow, in an article in the *Forum* (vol. xxviii., p. 101), that not one acre in fifty was directly fertilised for wheat in the United States.

pastures have been brought under the plough, to the detriment of the cattle. The people can no longer afford to leave sufficient land fallow, or under grass, for their oxen and cows.' (Hunter's *Gazetteer*, vi. 49.) They are obliged by necessity to content themselves with the small returns of unmanured ground. It is the great prerogative of man 'to look before and after'; and in agriculture, as in other pursuits, the condition of continued prosperity is to provide in the present for the wants of a somewhat distant future; and, while increasing wealth will probably result from the exercise of this foresight, the penalty of inability to do this is almost sure to be increasing poverty.

94. In any case, the cultivation of the soil, without taking means to restore the fertility which continued cropping more or less impairs, is a mode of procedure that can only be of temporary advantage to any country, and cannot be of advantage at all unless it leads to the accumulation of wealth, which will render possible the restoration of fertility to the soil when exhaustive cultivation can no longer be pursued. Cultivation on the system originally practised in America, involving the use of a greater and greater extent of land to increase the production, is known as **extensive cultivation**, as opposed to the system of **intensive cultivation**, which consists in putting more into the land to get more out of it; and the furtherance of the latter system—that is, the increasing use of manure—is always a sign of advancing agriculture and industry in general. The great productiveness of wheat in some of the countries of western Europe is due to the practice of this system.

95. Reference has already been made incidentally to the loss of soil where the crops are grown on hill slopes. But such loss is apt to occur wherever there is sloping ground, and especially where the crop does not cover the soil completely. Where grasses, including the ordinary European cereals, are grown the loss from this cause is not rapid, and may be made good by the natural formation of new soil; but it is otherwise with such crops as maize, cotton, tobacco, &c., which have considerable intervals between the individual plants. All the more serious is this loss if the climate is arid and the soil loose and powdery. In such cases, accordingly, the practice has grown up in America of forming with the plough long mounds, known as **mangum terraces**,[1] at right angles to the direction of slope so as to arrest the flow of soil-bearing water. In general, however, the tendency is for the higher parts of ground to become impoverished from the depletion of soil and the removal of fertilising constituents. The lower parts are, it is true, correspondingly enriched where there is no tendency to an excess of moisture. The most productive parts of sloping ground are for the most part those just above the lowest level—one reason for the prevalence of agricultural villages at the base of hills.

96. IRRIGATION. As manure is the means of correcting

[1] See the illustration on p. 564 of Professor Russell Smith's *The World's Food Resources*.

deficiencies in the soil, whether these be original or the result of exhaustion, so **irrigation** is the means of remedying one of the great defects of climate in many regions, the deficiency of rain. The ease with which this remedy can be applied varies greatly according to circumstances. Nowhere is it easier than on the land adjoining those rivers which regularly overflow their banks, like the Nile, the Tigris and Euphrates, or the Ganges. In such cases, all that is necessary is to provide canals and sluices by means of which the flow of water over the surface of the land may be to some extent regulated; and it is likewise a fact of the highest importance that the irrigation of land so situated is not only exceptionally easy, but also of exceptional value. For a river when highest in flood is always most highly charged with fertilising sediment; and so rich is this in the valley of the Nile, for example, that wherever 'red water' can be supplied there is no need for manure. In the Ganges valley, again, 'embankments are in few places required to restrain its inundations, for the alluvial silt which it spills over its banks year by year affords to the fields a top-dressing of inexhaustible fertility. If one crop be drowned by the flood, the cultivator calculates that his second crop will abundantly requite him.'

97. In other cases, various more or less costly methods have to be employed to render water available. Water may be raised by buckets from wells or rivers. Large tanks may be constructed to store the superfluous waters of one season or period against the deficiencies of another. Great canals may be fed from the higher parts of a river-course, and employed to convey the river-water to the tracts lower down.

98. In some places the structure of the country is such that when holes are dug in the ground to a certain depth water rises freely to the surface often with great force. Wells so made are called **artesian wells.** Such wells have been sunk in many regions where the rainfall is deficient. Great hopes are entertained that by this means large areas hitherto wholly or nearly barren may be brought into cultivation, or be made more highly productive. But it has always to be borne in mind that such wells bring to the surface only a small portion of the water that falls upon a given area in the form of rain, and that it is hence impossible in this way to render the whole of any region characterised by a very deficient rainfall fit for agriculture (22). On the other hand, the water brought to the surface by means of an artesian well, or by any other means, can be much more profitably used in agriculture than an equal quantity of rain. It can be preserved in tanks till the exact period at which it is needed. It is thus kept from sinking into the ground to a great depth, and so becoming lost to vegetation, as happens to much of the rain that falls upon the earth where the soil is highly porous. At the same time it suffers infinitely less loss than generally diffused moisture through evaporation—a matter of peculiar importance in those bright and warm regions where irrigation is specially

required. For crops of great value it is even sometimes found of advantage to distribute the water to the fields entirely by underground pipes. By the adoption of this method evaporation is almost wholly prevented. Moreover, irrigation water recovered from underground is always more or less impregnated with dissolved earthy matters, which may, indeed, in some cases be injurious to vegetation, but more commonly serve to increase the fertility.

99. It will thus be seen that though irrigation is almost always a costly process, the **advantages** derived from it are correspondingly great. They are chiefly these. **(1)** The supply of water by irrigation is more certain and regular than that by rain even in regions where the rainfall is generally plentiful, and that of itself increases the productiveness of irrigated crops. **(2)** Irrigation water is generally more or less rich in fertilising ingredients according to circumstances. In India it is found that as a general rule irrigation doubles the weight of crops off the same land. **(3)** Irrigation by flooding is sometimes of service in washing away noxious constituents from the soil. **(4)** Irrigation often enables valuable crops to be grown in place of inferior ones. **(5)** It renders cultivation possible in some cases during the whole period of the year for which the temperature is sufficient in the irrigated region. 'Thus in the southern part of California, as well as in Western Arizona, crops may be started at whatever season suits the convenience of the grower, except two months in the year, and this holds true for market-gardens as far north as San Francisco. In Tulare and Kern counties [35°–37° N.] five cuts of alfalfa [lucerne—**623**] have been taken off the same field in a single season.'[1] In Algeria three crops of potatoes may be grown in succession in one season on irrigated land. Hence it naturally follows that the density of population in irrigated regions often reaches a very high point, even when the bulk of the population depends upon agriculture. In the irrigated portion of the Spanish province of Murcia, for example, the density is nearly 1,700 to the square mile, as compared with 85 per square mile for the average of Spain generally.

100. It is one of the chief advantages of **terrace cultivation**—that is, the cutting of hill slopes into terraced fields rising step-like above one another—that fields so made are irrigated with great facility. This mode of laying out fields is hence largely practised in the warmer parts of the world, and in some cases a marvellous amount of labour is expended on their original formation. Describing the ascent from Hodeida to Sana in Yemen, Major-General Haig writes as follows: 'The whole mountain side, for a height of 6,000 feet, was terraced from top to bottom. The crops had all been removed; only some lines of coffee trees here and there were to be seen, but everywhere above, below, and all around, these endless flights of terrace walls met the eye. One can hardly conceive the enormous amount of labour,

[1] *U.S. Census Report* (1880), vi., p. 16 of section on California.

toil, and perseverance which these represent. The terrace walls are usually from five to eight feet in height, but towards the top of the mountain they are much higher, being sometimes as much as fifteen and eighteen feet. They are built entirely of rough stone laid without mortar. I reckoned on an average that each wall retains a terrace not more than twice its own height in width. So steep, in fact, is the mountain, that the zigzag continues almost the whole way to the top.'[1]

101. The extension of irrigation works in many of the drier parts of the world—Egypt, Mesopotamia, India, Turkestan, the United States, Canada, Australia, and South Africa—may be noted as a special feature of recent economic development. But irrigation after all is confined to very limited areas, and however productive it makes those areas it seems probable that a much greater aggregate increase of production is likely to result in the end from the extension of the practice of what is called **dry farming.** By this is meant the treating of the land in such a way as to conserve the moisture which it contains, the essential feature of that treatment being to prepare the surface in the form of a mulch. This term is applied to any covering of the surface that tends to resist the action of capillarity and protect the moist earth underneath against the direct rays of the sun. Even stones spread thickly over the ground may serve as a mulch, and hence it is that in the drier parts of the Mediterranean region stony tracts are regularly sown which in a moist, cool climate like that of the British Isles no one would think of cultivating. In gardening operations mulches are made with leaves, manure, straw, and similar materials, which, though very effective as mulches, have the drawback of preventing the continual stirring of the land and consequently the aëration of the ground underneath. But this continual stirring itself provides an excellent mulch in the form of a dry powdery surface soil, and it is by the frequent use of the plough, harrow, and other implements of tillage that dry farming is generally carried on. In loose light soils this treatment is supplemented by the use of an implement known as the sub-surface packer to consolidate the earth underneath the surface and so retard capillary action.

102. The methods of dry farming have long been known and practised in the drier parts of India, southern Russia, and elsewhere, and of late years have been more and more widely and eagerly followed in the arid regions of the United States and Canada. With a view to the encouragement of this method of farming a recent Act of Congress of the United States provided for the acquisition of homesteads of 320 acres in Montana, Oregon, or Washington, where the land is not mineralised, is not capable of irrigation, and contains no merchantable timber. But nowhere, it may be, do these methods seem to hold out the promise of a greater revolution in production than in South Africa. Abundant crops of wheat, and even maize, have been grown by these

[1] *Proc. R.G.S.*, 1887, p. 482.

methods on the government experimental farm at Lichtenburg, in the west of the Transvaal, about 150 miles due west of Johannesburg, and within 40 miles of the Bechuanaland frontier. Seeing, however, that a great amount of labour and no little capital are obviously involved in dry farming, we must await the results of a wider experience before we can look forward to the production of large amounts of such crops in regions of scanty rainfall.

III. Labour and Its Efficiency in the Local Production of Commodities

103. LABOUR. The influence on production of what is usually designated labour, that is, manual work, varies with the quantity required and the quality available to furnish a given amount of product. In such industries as coal-mining the quantity required to produce a certain value is high, about two-thirds or more of the total cost.[1] Before the war the average cost of labour in finished articles of engineering was estimated at 45 per cent. of the total, in textile products at only 15 per cent. (See also **115.**) The quality of human labour cannot always be measured. Where it is measurable, it is by the amount of product per head turned out in a given time, whether without the aid of machinery or in association with machinery of the same type (**105**); and it is obvious that a high production per head in any region or industry is what renders possible a large surplus for employment in other industries or for leisure, which latter use may be itself contributory to a high rate of production in working hours.

104. Human labour may be broadly divided into slave, or forced, and free labour, the latter being that which is now almost universally employed in the production of commercial commodities. There are, however, great diversities in the condition even of free labourers in different parts of the world. A table in the Appendix gives examples of these diversities from one point of view, namely, that of money wages; and it will be observed that the highest wages are those paid in new countries, like the United States and British North America, the Australian colonies, Uruguay, and the Argentine Republic, in which the natural resources of the countries are very imperfectly developed but are being rapidly utilised, or, in other words, where land, inherently valuable from the nature of the soil and climate, is still cheap from the sparseness of the population, but is in process of

[1] In a paper read before the Royal Statistical Society in 1903, on 'British Coal Exports, 1850–1900,' the late Viscount Rhondda, then Mr. D. A. Thomas, estimated the labour cost in coal at the pit mouth in South Wales at about four-fifths of the total value (*Jour. R. Stat. Soc.*, lxvi., p. 454). According to a statement made to the House of Commons by the President of the Board of Trade in July 1919, the labour cost at the pit mouth in England and Wales in 1913 was about 70 per cent. of the total, and according to another, made by his successor, the ratio in the last quarter of 1919 was about 64 per cent. This throws light on the great influence which the post-war shortage of labour and consequent high labour wages have had on the cost of all commodities into which the cost of coal enters to any considerable degree.

becoming dearer through the more or less rapid increase of the population. The lowest wages, again, are paid in tropical countries, and in particular in those regions in which there is an exceedingly dense population dependent mainly on agriculture.[1]

105. The highest-paid labour is as a rule also the most efficient, that is, able to produce a greater result within a given time. 'At the Fama Mill at Tlalpam [Mexico] weavers [in cotton mills] cannot be got to run more than two looms each, whereas, at the Fall River Factory, in Massachusetts, a good weaver will run six or eight looms. The boys at Tlalpam can manage only 450 spindles each, but at Fall River a quick girl will see to 700.'[2]

The reason of this difference of efficiency is to be found in various causes. Much is undoubtedly due to difference of race and climate, but much also to difference in food and dwellings and to difference in intelligence, the highest-paid labourers being those who can afford to live in the best houses and eat the most nourishing food. This last consideration is what leads many to think that sound social legislation, even if leading to large expenditure, would probably soon prove remunerative, and, seeing that all the countries of the world now work more or less for one another, that the people of the world generally would benefit by the world-wide spread of such legislation.

106. But the condition of the labourer also is very inadequately indicated by the difference in the rate of wages, since the wants of the labourer are very greatly affected by different circumstances, and above all by climate. In a region where the winters are severe, the labourer has to spend more in providing himself with adequate protection against the weather by means of good housing, clothing, and fuel than he has to do in a region where the climate is less severe, without being better off in health and comfort than a labourer in the more favoured region. The food required in a temperate climate, and especially one of the colder temperate countries, moreover, is of a much more expensive kind than that suitable to a tropical or warm temperate climate. The

[1] Thus in Oudh, one of the most densely peopled territories in British India, the average monthly wage for an able-bodied agricultural labourer in 1901–3 was 3·0 to 3·7 rupees, or about 4*s.* to 4*s.* 11*d.*; in Burma, the most sparsely peopled province in proportion to its resources, it was 14·1 to 15·1 rupees, or about 18*s.* 9*d.* to 20*s.* 1*d.* (*Imp. Gaz. India*, new ed., iii., p. 472).

[2] *Report by Consul Jenner*, Mexico, May 26, 1886. In 1885 there were for every 100 persons employed in cotton factories in the United Kingdom 8,798 spindles and 111 power-looms; whereas in India, in 1882–83, for the same number of persons employed, there were only 3,085 spindles and 28 power-looms. In 1890 the corresponding figures for the United Kingdom were 8,416 spindles and 112 power-looms, in 1899–1900 in India 2,902 spindles and 24 power-looms. In an official report published in 1919 [Cmd. 442] we read (p. 37), in a paragraph dealing with the relative efficiency of Lancashire and Indian operatives in the cotton industry:—'It has been stated that the ratio of efficiency is as 2½ to 1. . . . I am informed that in Cawnpore nine men are still required to work a mule of 800 spindles where, it is said, only three would be necessary in a Lancashire mill. A Lancashire weaver usually minds four looms by himself . . . whereas in India 50 per cent. of the weavers will only mind one loom.'

account given in a previous paragraph (71) of the mode of life of an inhabitant of a country district in Colombia, will serve to give an idea of the requirements of labourers in other parts of the tropics also; but even in Japan, which lies in the same latitude as the east of the Mediterranean, and has a much severer climate, the farm labourers live almost entirely on rice, barley, or wheat, beans, pease, and other vegetable food, in summer wear little more clothing than 'that which nature sent them into the world with,' and in winter a cotton garment or two, with straw sandals and wooden clogs for foot wear. It is worthy of being pointed out, however, that those parts of the world in which the highest wages of all are paid are also those in which many of the most important necessaries of life are cheap. Cheap land ensures relatively cheap food, which more than makes up for the dearness of manufactured articles to the working-man; and the advantage of high wages is still further increased if the climate is mild, as in Australia.

107. Even free labour is subject to many restrictions imposed by custom and religion, by government interference, or by the voluntary organisations of the labourers. In all Christian countries custom and religion have established the Sunday as a day of rest; and though this abstention from ordinary labours on Sunday is probably nowhere rigorously adhered to, it is more generally observed in the British Isles and the countries of British origin than elsewhere. In Roman Catholic countries, and the countries belonging to the Greek Church, the days devoted to religious festivals take a more prominent place in interrupting the ordinary course of labour than they do in Protestant countries. In Mohammedan countries Friday (even in pre-Mohammedan times a day of rest in Arabia) is specially devoted to religious services, but it is less rigorously observed as a day of rest than the Sunday in Christian lands.

108. The interference of government with the employment of labour in free countries is in some cases in the form of enactments limiting the number of hours of work to be exacted in a day; in other cases in other modes. The Factory Acts in the United Kingdom professedly limit the working-hours in factories only for women and children; but as almost all factories can be worked only when such labour as well as that of men is available, they have the effect of limiting the number of hours' work in such establishments absolutely. The provisions in those Acts that expressly apply to adult male workers are only such as are intended to secure health and safety. Since the outbreak of the war however, there has been a marked tendency to limit the number of hours' work even for men. The employment of the young is now limited in Great Britain under the Education Acts. Under the English Act of 1918 no child under 12 may be employed at all, and no child under 14 (in Scotland under the Act of 1919 no child under 15) may be employed in any factory, workshop, mill or quarry, and no young person under 16 (eventually 18) may, subject to certain exemptions, be

employed in any manner incompatible with attendance for a certain number of hours annually at continuation schools. The Employers' Liability Act of 1897 renders employers liable in certain cases for injuries sustained by persons in their employment, whether there may have been any contributory negligence on the part of the injured or not, and in 1900 another Act extended this liability in certain cases to agricultural employers. There is similar legislation in many European countries. In Switzerland the limitation of hours expressly applies to men as well as women, and in Germany the Imperial Industrial Code empowered the Imperial Government to limit the hours for men and women alike where excessive hours were deemed to be injurious to health. The former German empire was the pioneer in the insurance of workmen against illness (under an Act of 1883), against accidents (1884), and in providing for old-age pensions, beginning at the age of seventy (1889). In the United States there is an Act limiting the number of hours in the day's work in all government establishments to eight. Labour legislation generally, however, is in that country a matter reserved to the individual states, and in such legislation Massachusetts has mostly been the leader.[1] In the United Kingdom a labour bureau has been organised for the purpose of collecting information as to wages and employment both at home and abroad. In New Zealand and New South Wales the labour legislation includes provisions for compulsory arbitration.

109. Trade-unions and similar voluntary organisations among labourers impose various restrictions on the labour of their members for the sake of what is believed to be the general interest of the body, the efforts of these organisations being directed mainly to the obtaining of as high wages and as short working-hours as are possible in any given state of trade and industry. Such organisations are most highly developed in countries, like the United Kingdom and the United States, in which manufacturing industry is most highly advanced; but unions having similar objects have existed at all times in many countries. Among the labourers of **China** trade-guilds exercise important functions of various kinds. Chinese emigrants carry the system with them into the lands to which they emigrate, and in some cases are thus enabled to obtain a better standing for themselves. In **India** the caste-system as now developed acts to some extent in the same way. As a trade-union each caste 'insists on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, and promotes good fellowship by social gatherings.' (Hunter's *Gazetteer*, 2nd ed. vi. 197.)

110. The kind of labour known as **coolie labour** is a form of free

[1] A paper by Wm. F. Ogburn on 'Progress and Uniformity in Child Labour Legislation,' in *Studies in History, Economics, and Public Law*, Columbia Univ., 1912, shows the tendency of the more backward states in this respect to move forward.

labour, but a peculiar one. The labourers known as coolies are emigrants from India and China who bind themselves to work for a term of years (generally five) on plantations in European tropical and subtropical colonies. They are entitled to regular wages while their term lasts, and in some cases to a free passage back to their own country when their term has expired. Contracts for the engagement of coolies in India and China are allowed only under certain regulations, and it has sometimes been found necessary, owing to the treatment to which the coolies have been subjected, for the government of the country from which they are derived to prohibit such engagements with certain colonies altogether. Still worse abuses were sometimes connected with the introduction of Polynesian labourers into Australia (**1383**).

111. Somewhat similar contracts are made even with bodies of European labourers, the chief difference being that in their case the work on which they are engaged is not the tending of plantations, but the execution of some great piece of engineering. At the present time it is Italian labourers that are principally so employed. In central Europe, 'these labourers are "supplied" to any number by contract agents in Vienna, and they arrive on the ground with something like the mobility and precision of regular troops.' They were even introduced into the United States, and were very largely employed there in the construction of railways; but their further introduction was prohibited by an Act of Congress in February 1885, which made the importation and migration of foreigners and aliens under contract illegal.[1]

112. Slave labour in the strict sense of the term is now almost confined to the tropics, and Africa is the only part of the world where slavery still flourishes. At one time or another, however, slavery has been practised in all countries, and even in Europe down to the nineteenth century. It is only within the last fifty or sixty years that the system was put an end to in the tropical colonies of European countries, Great Britain having set the example in 1833 by passing an Act for the emancipation of the slaves throughout the British dominions. So far as the production of commercial commodities was concerned, the immediate effect of the abolition of slavery was in many cases disastrous. The freed negroes (for people of African origin formed the slaves in all parts of America) preferred, wherever plenty of land could be had, to live the life described in par. **71**, instead of working for wages, however high, on plantations. The consequence was that in Jamaica, for example, the annual value of the exports fell from an average of nearly three millions sterling during the period 1832–36 to less than two millions in the period 1842–46. In densely-peopled islands like

[1] They were largely employed by the Russians in laying their railways in the remotest parts of Asia. A correspondent of *The Times* found 200 Italians among the workmen in an out-of-the-way railway settlement in the Khingan Mountains in Manchuria in 1902.

Barbados, where the negroes when liberated were obliged to work in order to gain a living, the effect was not so bad. In other parts of America in which slavery has been abolished subsequently, the effects have varied similarly according to circumstances, being little marked in respect of the quantity of production, at least where there were facilities for replacing slave by free labour, and especially by the labour of white men. In parts of Brazil, for instance, the change from slave to free labour was eagerly welcomed by the entire body of the inhabitants, inasmuch as the work was done 'better, quicker, and with more care' by free men than by slaves, so that the benefit of emancipation was at once realised.

113. There are other forms of forced labour besides that maintained by the system of slavery. The system of **serfage**, according to which individuals with separate rights and separate property were yet attached to particular estates for the owners of which they were compelled to work, and were usually sold with the estates, subsisted in Russia till 1861; and forced labour for certain purposes was up till recently exacted by the Dutch government in the East Indies (**1084**), and by the government of Egypt (**1140**). In Latin America multitudes of the population are kept in virtual slavery by the system of **peonage**, by which the poorer people are encouraged to contract debts to their employers, and care is taken to prevent them from obtaining release from those debts. It is one of the most difficult tasks of the British administration in India to protect the peasantry against similar abuses on the part of money-lenders. At present there would seem to be an ominous tendency to the introduction of forced labour, in various forms that cannot be stigmatized as downright slavery, into most parts of Africa; but it is a healthy sign that some of the strongest protests against this come from the working classes of the most advanced countries.

114. MACHINERY. The nature of the change that has been made in the conditions of production in manufacturing industry through the introduction of machinery is sufficiently illustrated in pars. **370-2**, where some account of the influence of modern machinery in the cotton manufactures is given. Here it will be enough to call attention to the fact that the changes due to this cause have all come about within little more than a hundred years, and that this applies even to the most important agricultural implements made of iron, which, along with agricultural machinery properly so called, have during the same period effected a parallel revolution in the condition of agriculture. The cast-iron ploughshare is an invention little more than a hundred years old (it was patented in England by Messrs. Ransome of Ipswich in 1785); and it was after the beginning of the nineteenth century that the cast-iron plough came into general use in America. Where fuel is abundant steam is now the prevailing means of driving machinery, though with increasing competition from explosive gas

and other forms of internal combustion engines. Before steam came into use **wind-power** (chiefly in level countries) and **water-power** (chiefly in mountainous and hilly regions) were largely employed, and water-power is now indeed rapidly growing in importance. Even **solar heat** is used [1] as a source of power where the sunshine is sufficiently constant. The vast amount of **tidal-power** that might conceivably be utilized has again and again engaged the thoughts of engineers, but so far little has been achieved in this direction. Locally this power is used for such purposes as the deepening of harbour entrances, as at Venice and elsewhere, but the difficulties in applying this power to the driving of machinery have not been successfully overcome. Only in the most favourable conditions could this power be made available for any considerable portion of the day, and there is the added difficulty that the power is supplied three-quarters of an hour later every day. Nevertheless, a tidal mill was described as seen at work by Arthur Young in the Gironde in 1788, but it is a tribute to that keen observer's insight that he remarks that it is doubtful whether the power thus applied would prove as economical as that derived from steam by the newly improved steam-engine.[2]

115. The utilization of machinery in production is in some cases dependent more or less on physical conditions, in others on the supply and attitude of labour. The extensive employment of agricultural machinery is influenced very largely by the surface features, great level plains being obviously peculiarly favourable to its use. But even where the superficial configuration presents no great obstacles to its use the climate may prove a hindrance, soft wet soils being quite unsuitable for heavy machines. In coal-mining it is only the thicker and more continuous seams that are well adapted for coal-cutting machinery. This is one reason why the use of such machinery has increased much more rapidly in the United States, where the seams of bituminous coal now worked are only such as can be worked easily, than in the United Kingdom, with its older industry, where most of the seams very easily worked have been worked out.[3] Where labour is very abundant and cheap the use of machinery may not be economic, but the employment of machinery even where it would be economic is frequently retarded by the opposition of the workers to its introduction. In rapidly developing new countries or regions this hindrance is

[1] As in southern California (see *For. Off. Report, Annual Ser.* No. 2825, p. 30) and Egypt, for raising water (*Jour. Soc. Arts*, Feb. 6, 1914, p. 245).

[2] A. Young, *Travels in France*, edited by Miss A. Betham-Edwards, p. 68. A scheme of this nature is now being carried out, it is said, in the west of Schleswig-Holstein, by connecting the islands of Nordstrand and Husum with the mainland by dams so as to form two reservoirs at different levels to be filled and emptied at different states of the tide. See also pars. **696** and **781**.

[3] Percentage of coal cut by machinery :—

	1891	1900	1906	1913	1916
U.S. .	5·3 per cent.	24·9 per cent.	34·7 per cent.	50·7 per cent.	56·4 per cent.
U.K. .	—	1·5 ,,	4·1 ,,	8·6 ,,	9·8 ,,

scarcely met with, and that is another reason why coal-cutting and many other machines, even when invented in this and other old countries have first been generally adopted in the United States. There the workmen are generally more keenly on the look out than those at home for opportunities for improving their position by change of place and even of occupation, and better provided with the means of doing so. But the attitude of the workers in old countries is at least intelligible. Their first thought with regard to machinery is apt to be that it is a means of displacing labour and so reducing its price; and though in the long run the effect of machinery may be to ease the burden of labour and increase the abundance of produce available for the labourer, its immediate effect is often to inflict hardship on some. If the workers cannot all share in the benefits of machinery from the first, it is natural that they should at least desire to have the incidental hardships of its introduction mitigated as far as possible. That gives importance to efforts which have been made towards such mitigation by large employers.[1]

116. In recent years the economic distribution of power has been greatly affected by the progress of invention, which has made sources of power commercially available that were not so before. In illustration of this one may refer to the increasing use of oil, alcohol, and gas as sources of power. The use of oil has a geographical significance not merely in connection with the distribution of mineral oils and oil-shales, but also because recent inventions have made it possible to use even vegetable and animal oils for the purpose. The use of gas is important because it allows of inferior coals being employed for the production of fuel in this form, and the use of alcohol stimulates the production of potatoes as a cheap source of this spirit. But it has been chiefly with the aid of **electricity** that this kind of economy has been effected, and probably in no other direction has greater progress been made since the publication of the first edition of this work. Electricity is not a source of power. It is merely a means of transmitting and applying power developed either by fuel or gravity (moving water or air). When the great mechanical inventions were first introduced they were applied chiefly by means of water power. Afterwards this gave place, except under the most favourable conditions, to the more reliable steam power. The transmission of power originally derived from falling or rapidly flowing water by means of electricity has given value to many water powers which were formerly useless. Power has thus been transmitted in the United States a distance of 400 miles. In certain industries electricity, most frequently developed from water power, is already completely victorious over steam. These are the industries in which excessively high temperatures have to be produced, as in the smelting of aluminium ores,[2] the manufacture of

[1] See J. M. Robertson, *Economics of Progress*, pp. 103–4.
[2] Electricity first came to be of importance in metallurgy about 1879.

carbide of calcium and the fixation of atmospheric nitrogen, or great resistances (including strong chemical affinities) have to be overcome, as in the grinding of wood to wood-pulp and the dissociation of elements in certain very refractory chemical compounds. In these cases immense water powers are the sole means available for developing the electricity with the necessary economy. (See also pars. **514**, **652**.)

117. But electricity is in some ways an advantage even where coal or other fuel is burnt in order to develop it. Though there is a loss of energy in converting the power latent in coal into the form of electricity and then converting electrical into mechanical energy, yet electrical power can be transmitted to a distance with less loss than steam power. This leads to several economies. The coal can be used to develop electrical energy where it is cheapest. It can be used for that purpose in one great establishment on a large scale, instead of in many places on a small scale; and in the end each one who uses the power can take for his requirements just as much as he needs and when he needs it. It thus becomes possible, where a great installation has been set up providing power up to a certain maximum required only occasionally, to make a certain proportion below this maximum, the so-called **off-peak electricity**, available at a cheaper rate for industries capable of making use of it whenever supplies can be obtained. Electrical power can be turned on like gas for lighting. Thus one gets rid of numerous steam-engines, each of which required its own attendants, and had to be kept ready for work at the cost of fuel, even at times when there was no work for it to do. It applies the power with great smoothness and steadiness, an advantage of great importance, for example, in the textile industries and in steel rolling mills in which it is rapidly becoming more extensively used. When used for locomotion its advantages are various. First, it brings about acceleration more rapidly than steam, and that is one great reason why it is becoming so largely used on railways with a dense traffic and numerous stoppages inasmuch as a more frequent service of trains is thereby facilitated. Next, it maintains a strong pull on the load at higher speed than steam, which accordingly makes it superior to steam haulage where the trains are heavy and especially where the gradients are severe. Thirdly, it is possible to apply electricity in haulage over lines with stiff gradients in such a manner as to effect great economies in fuel by recovering and storing up power on the down grades where the trains are more or less impelled by gravity. While, moreover, the electric smelting of iron ores is becoming more common where water-power is available in a convenient situation with reference to the ores, it is to be noted that where electric installations can be economically established for such purposes the power thus developed can then in many cases be utilised with advantage for other industries besides. In the United Kingdom the use of electricity in industry was doubled during the war.

118. DEVASTATING AGENTS. War, the great occasional disturber and hinderer of production and commerce, has already been considered (**30**); but there are others with which one has to lay one's account as more or less normal though not regular in their action. These may be classed under two heads—physical destroying agents, the most important of which are directly or indirectly due to climatic conditions; and destructive forms of life, whether vegetable or animal.

119. Among the physical destroying agents we may mention first, **frost,** from which most tropical and sub-tropical plants, such as coffee, tobacco (**381**), cotton (**356**), &c., suffer greatly when they happen to be exposed to it.

120. In certain regions, and especially in those which have a climate at once warm and arid, **hail** is often much more destructive than we could form any idea of from the character of the hailstones which usually fall in England. In such regions the hailstones are sometimes as big as eggs. In the summer of 1883 a hailstorm in the government of Tomsk, in western Siberia, was reported to have been attended by the fall of stones which killed both animals and human beings; and in the same summer a still more destructive hailstorm was reported from Iowa, U.S. Its track was four miles wide. 'All vegetation was destroyed in its course. One woman lost her life, and many persons were injured. Twenty-two cattle were killed. The hail fell in some places to a depth of five feet.'[1] At the Colonial and Indian Exhibition held in London in 1886, a corrugated iron roof perforated with large holes made by hailstones was among the articles exhibited in the section devoted to the Cape Colony. Reference is hardly needed to the destructiveness of **violent winds** at sea, but it may be noted that great devastation is sometimes wrought on land by the hurricanes of the N. Atlantic, north of 10½° N., the typhoons of the S. China Sea principally between the south coast of China and Formosa, the cyclones of the Indian Ocean and especially the Bay of Bengal occasionally raging nearly as far south as 6° N., and above all the tornadoes of North America, where such storms reach farthest north and farthest into the interior of the land. Hurricanes and typhoons occur chiefly in late, tornadoes in early summer, and the Indian Ocean cyclones mainly at the change of the monsoons—from April to June, and from September to November.

121. To certain crops, and especially those which depend greatly on the amount of blossom that comes to maturity, like fruit-trees, cotton, coffee, &c., great damage is often caused by unseasonable winds of less violence; but more destructive on a large scale than any of the agents yet named is **drought.** The regions liable to suffer most heavily from this cause are those which lie on the border-line between regions in which an abundant, or at least sufficient, rainfall can always be depended on, and those in which the rainfall is too scanty to admit of

[1] *Nature*, vol. xxviii., p. 376.

settlement without irrigation, but in which the rainfall, though sufficient in most years, is apt from time to time to fail. In the densely peopled regions of India and China that are so situated, the failure of rain has often caused the loss of millions of human lives ; but in the less populous regions in the interior of North and South America, and in Australia, the destruction caused thereby is confined to sheep and cattle and other kinds of livestock. Between 1883 and 1884 the number of sheep in New South Wales declined from about 34·4 to about 30·4 millions, mainly from this cause, directly or indirectly—that is, either by the death of the animals, or their sale to other colonies less affected by drought in that year.[1]

122. Great destruction is sometimes wrought by **inundations** on the banks of great rivers like the Hwang-ho, Mississippi, and the Ganges, or even like the Danube and some of its more important tributaries (**884**), and on low-lying lands in the neighbourhood of the sea. Stupendous embankments have been constructed along the Ganges in Lower Bengal to guard against this danger, but these restrain 'without altogether preventing' the excesses of the inundations ; and the same may be said regarding the similar works that have been executed in the United States and the Hungarian plains, on the banks of the rivers above named. Among the more memorable excesses of the sea may be mentioned that by which the greater part of the present Zuider Zee was submerged (thirteenth century), and that by which an area of about 3,000 square miles at the head of the Bay of Bengal was overwhelmed, and many thousands of people lost their lives, during a cyclone in November 1876.

123. Volcanic outbursts and **earthquakes,** though fortunately comparatively rare occurrences in their more awful forms, may also be mentioned as physical agents which occasionally produce widespread destruction.

124. The **living destructive agents** are probably on the whole more injurious than any of the physical agents above mentioned, inasmuch as many of them are extremely persistent, being very difficult to extirpate, and renewing their attacks on particular crops or on various forms of vegetation year after year. The mere enumeration of such destroyers would fill a volume, and whole volumes have been devoted to accounts of individual pests of this kind, and here accordingly we can only allude to a few of the more important.

125. The **vegetable pests** consist mainly of minute **fungi** which settle upon various parts of a plant and indicate their presence by the discoloration they produce. Such, for example, are the fungi which produce the disease known as rust in cereals, that known as mildew on the vine (**294**) and on many other plants, subject to attack each

[1] From the same cause the number of sheep declined in New South Wales from 61·8 millions in 1891 to 36·2 millions in 1899, in Queensland from 21·7 millions in 1892 to 10·0 millions in 1901.

from its own fungus, and the fungus (*Hemileia vastatrix*) which has done much to destroy the cultivation of the coffee-tree in Ceylon (**410**).

126. Of **animal pests,** the most destructive, on the whole, are insects. Among these may be mentioned **locusts,** different species of which infest treeless arid regions in both the Old World and the New, being thus fortunately confined to areas in which there is little cultivation. From time to time, however, they invade cultivated fields, where they arrive flying in thick solid masses, filling the air, darkening the sun, forming an immense unbroken cloud, which may take more than an hour to pass by, and, when they settle, consuming every green thing to be seen, the working of their jaws meanwhile causing a sound which can be heard at a great distance. Equally sweeping in its destruction is the insect known in the United States as the **army-worm,** which is the larva or unwinged stage of a kind of moth, and owes its name to the fact that on the march the 'worms' all 'keep together like an army of soldiers, and usually advance in a straight line.'[1] Of grass or young grain that comes in their way they eat up every vestige, but when grain has grown enough to form a head, they eat only the leaves, and then climb up the stalk, cut off the head, and drop it to the ground. Among insects destructive to particular objects of cultivation may be mentioned the **Hessian fly** (*Cecidomyia destructor*, Say), which attacks wheat and barley, and has proved peculiarly destructive in various parts of the United States, so as to lead to the abandonment, for a certain time at least, of wheat cultivation in certain districts; the **Colorado beetle,** which wrought great ravages among the potatoes in the United States in many years subsequent to 1861; the **phylloxera,** which for a time put an end to the cultivation of the vine in several departments in France, and greatly reduced it elsewhere (**294**); the **boll-weevil,** which of late years has wrought great destruction in the cotton-fields of the United States, and in Egypt, where another weevil also works great ravage. Other insects are the carriers of disease to domestic animals (**1193**), as well as to human beings (**127**). To the lower forms of animal life belongs the parasite which produces the silk-worm diseases (**342**). Among destructive animals of a higher type may be mentioned, first, sparrows, which have multiplied so rapidly since they were introduced into Australia, that they have become a regular plague to the farmer. But a still more serious plague, both in Australia and New Zealand, has grown out of the introduction of the **rabbit,** the multiplication of which has in some instances compelled squatters to abandon their sheep-runs, and cultivators their holdings, and has already caused different Australian governments to expend hundreds of thousands of pounds in efforts to extirpate it, or rather to keep it down, since extermination seems impossible. **Rats** have proved equally destructive among the sugar-canes of Jamaica. The mongoose, a small but fierce carnivorous animal somewhat like a ferret, which was

[1] *Nature*, xxx., 243.

introduced into that island with great success to destroy the rats, has since become as great a pest itself through its raids on domestic poultry. In the parts of the Argentine Republic that have a similar climate to the pastoral regions of Australia, the native **vizcacha**, an animal with similar habits to those of the rabbit, is quite as destructive, and has likewise been the object of all sorts of devices to compass its extermination.

127. Minute organisms are the causes of many diseases in man which have a serious effect on production in the regions in which those diseases are prevalent, and it is fortunate that in recent years remarkable progress has been made in the knowledge enabling man to combat those diseases, and thus to give a much greater value to the regions affected. Some of these organisms are conveyed to man by insects. Malaria, yellow fever, sleeping sickness, and elephantiasis all belong to this class. **Malaria** is almost confined to those areas in which the mean temperature exceeds 60° F. for the summer months, and on the whole it increases in virulence towards the equator. It is now known to be set up in man by a microscopic organism introduced into the human system by mosquitoes belonging to the genus Anopheles, and in consequence of this discovery the disease has already been extirpated in many places in which it was formerly rife. Two methods are adopted in fighting against the disease. One is to destroy the mosquito, which is done when the insect is in the larval state. In that stage it floats on water, and where the water which might rear the larvae cannot be drained away, a thin film of paraffin oil on its surface may prevent the larvae from breathing. The other method is to destroy the exciting organism in the human body by doses of quinine. The discovery of the whole process of infection threw light both on the well-known connection between the various forms of malaria, including ague, and stagnant water, and also on the fact that all marshy districts, even in warm regions, were not malarial. Even where the mosquito was present the exciting organism might be absent.

128. It seems likely that in no long time there will be no remnant of truth in what is above stated on this subject. In Cuba and in Panama, the war against **yellow fever** has been waged with such success by Colonel W. C. Gorgas, a United States doctor, that it has now been entirely exterminated. The insect carrier in this case is the *Stegomyia fasciata*, and the immediate excitant a microscopic spirochæte. More stubborn is the resistance offered by **sleeping sickness**, a disease which is known to have been endemic in Africa for hundreds of years. From time to time it appears to break out as a scourge, and in the last few years it has carried off thousands in Uganda, the Congo region, and other parts of Central Africa. The disease has been ascertained to be due to an internal parasite, *Trypanosoma gambiense*, transmitted chiefly by a species of tsetse fly, *Glossina palpalis*, which is confined to the immediate vicinity of expanses of water, and this knowledge has led

to methods of protection which have had considerable success, though the disease is far from being vanquished. The discovery that the immediate excitant of the disease is also sometimes carried by the tsetse fly that causes cattle disease (**1198**), *Glossina morsitans*, which has a wider range in latitude, gives reason to fear the possible extension of the disease further south. **Elephantiasis,** of which the leading symptom is a swelling of the skin and the adjacent cellular tissue, a disease prevalent on the coasts of West Africa, India, southern China, the South Sea Islands and Brazil, is due to a filaria or microscopic worm carried by a group of the genus Culex, and has also so far baffled efforts for its extirpation.

129. Other diseases sometimes appearing as widespread epidemics are due to bacillus infection. Of this class is the **plague,** which is of two types, the bubonic, characterised by a swelling of the glands, and the lung form. Both are apparently due to the *bacillus pestis*, of which the carriers are rat-fleas. There is no limit to its geographical range. The black death of 1348–9, which was of the lung type, raged in the high valleys of the Alps as much as on the plains, in Greenland as much as in Italy. It is diffused along the lines of commercial intercourse, but fortunately modern sanitary regulations are sufficient to cope with it, at least in the temperate zones. **Cholera,** which is due to a variety of bacillus known as a vibrio or spirillum, is endemic from Bombay to southern China, but more particularly in Lower Bengal, and occasionally spreads like the plague along the lines of human intercourse. Again and again the great annual religious concourse at Hardwār, where the Ganges enters on the plains of India, has been the source of an outbreak, which has spread far and wide, and in recent years with a rapidity which corresponds to the improvement in the means of communication. An epidemic which started there in March 1892 reached St. Petersburg in less than five months, and before the end of August reached New York. In this case the protection now afforded by good sanitation is complete. Improved sanitary conditions have almost extirpated in Europe the once nearly universal disease of **leprosy**—another disease due to bacillus infection. The disease still has a firm hold in southern Asia, however, above all on the west coast of India, and has been introduced into America. There it is most prevalent on the north coast of South America and in Brazil.

VI. Circumstances Connected with the Exchange of Commodities.

TRANSPORT. Whatever method of transport be used great cheapening is always effected where full cargoes can be obtained in both directions, and hence the nearest approximation to this that circumstances allow is always aimed at. To enable one to appreciate the benefits which improved means of conveyance have conferred upon us, it will be worth while to give here some illustrations of the primitive and laborious modes of carriage still in use elsewhere.

130. In Central Africa, in various parts of south-eastern Asia, even in densely peopled districts of China and Japan, the land-carriage of goods still takes place to a large extent by means of **human porters,** or by **vehicles drawn or pushed by men** (1158). Probably the severest labour of this kind undergone in any part of the world is that which is endured by the carriers in the tea-trade between the south-west of China and Tibet. The tea has to be introduced into Tibet across high mountains, and is carried either on mule-back or by porters. A mule goes more than twice as fast as a human porter, but carries only half the load, a man's load being on an average nearly 200 lbs., in some exceptional instances more than 400 lbs. The package is borne on a light wooden frame, which is slung on the back by means of armholes, generally made of coir (**444**). Laden thus, the porters halt every few hundred yards to recover their strength, resting their burden meanwhile on a short crutch; for if they released it from their shoulders altogether, they would have difficulty in taking it up again. 'Travelling six or seven miles a day, and resting in the inns at night, they toil with their prodigious loads over two mountain passes 7,000 feet above their starting-place, along a rudely paved road, where every step of the way must be picked,' making a distance of 120 miles in twenty days or less, and receiving a sum equal to about 1*s.* 6*d.* or a little more, per day, according to the number of packages carried.[1]

131. In northern China human labour in the carriage of goods is sometimes aided by **sails attached to wheelbarrows,** the sails being in many cases so rigged that they may be raised or reefed at pleasure.

[1] Baber, *Travels and Researches in the Interior of China*, pp. 194–95. For numerous other illustrations of the cost of transport in China before the introduction of railways, see an article by the author of this work in the *Geographical Journal*, vol. xii. (1898), pp. 503 *fgg.*

This arrangement serves to allow of an increase of the load, but does not seem to reduce the demand on human labour. 'We have never seen these wheelbarrows without pity,' says Dr. Williamson in his *Journeys in Northern China*; 'the strain to the men who manage them is enormous; indeed, we have never witnessed human beings under such heavy labour. We met many with 14 bean-cakes on one barrow, equal to seven small donkey-loads, and often saw six bales of cotton on one barrow, though two are considered sufficient for a mule; but human labour is cheaper than animal.' **In Japan** there are two kinds of cart-carriage, one drawn by men, and one by a bull or cow. Where human labour is employed, there are usually two men in front and two behind. But, writes the Consul-General of the United States, 'I have seen an old man and a young woman, the latter with a small child strapt on her back, pulling a cart-load of wood or coal up steep hills and over sandy plains. Ten to twelve miles a day with a loaded cart is a day's work, and 600 to 700 lbs. an average load for two persons.'[1] For this heavy work a sum equal to from about 5*d.* to 10*d.* per day was considered at the time good pay.

132. Where the large **domestic animals** are abundant, it is scarcely necessary to say that by their use the call for human labour in transport is greatly reduced. As a beast of burden or a draught animal, in most European countries, and those which derived their civilisation from Europe, by far the most serviceable is the **horse,** but the ox is still largely used for the same purposes in central and eastern Europe—the horse specially valued for its speed, the ox for its strong steady pull. In southern Europe, and the region round the Mediterranean generally, the **ass,** which thrives better than the horse on the scanty herbage characteristic of that region, is an animal of much more consequence than in the rest of Europe, and hence is more cared for and of finer aspect and better qualities; and in the mountainous parts of that region, the **mule** is preferred to both on account of its sure-footedness and endurance, and to the ox on account of its sharing with the ass the power of thriving on coarse browsing. These qualities have secured the introduction of the latter animal, which is frequently mentioned in Homer, into all mountainous countries with a moderately warm and dry climate, both in the Old World and the New. **Reindeer-** or **dog-sledges** are used in winter in the snow-covered regions of northern Asia, Europe, and America.

133. In the most populous parts of Asia and in central Africa various breeds of **oxen** are the principal beasts of burden; and next to these, in Asia, come buffaloes, horses being for the most part neither numerous nor of good quality. In India the average load of an ox is about 330 lbs. In the mountainous parts of central Asia, including the Himalayas, a peculiar species of ox, known as the **yak**, which is found both wild and domesticated, and is characterised by long fine

[1] *Reports on Labour in Foreign Countries*, iii., 333 (Washington, 1885).

silky or slightly curly hair hanging down from various parts of its body, is used like the mule in southern Europe. In some parts of the same region goats and sheep are employed for the carriage of light burdens. The Asiatic **elephant**, which haunts the forests of south-eastern Asia from the south of the Himalayas to the borders of China, and the large tropical islands from Ceylon to Sumatra and Borneo, is invaluable as a beast of burden throughout that region, wherever there are no proper roads; for though, where roads do exist, it does not accomplish so much work in proportion to the food it consumes as the horse, the ox, or the buffalo, it can make its way across marshes and through forests which could not be traversed by any of the other animals mentioned. Throughout India, the catching of elephants is under government supervision, the chief elephant-catching establishment being in Lower Burma. The African elephant is no longer trained to labour, though it was so by the ancients, and in the north-east of Africa down to the close of the middle ages.

134. In deserts and regions remarkable for their drought, the **camel** is even more indispensable as a beast of burden than the elephant amidst forests and marshes. Provided with one or two humps of fat, which serve as stores of food, its stomach lined with hundreds of little cells or compartments capable of holding water, a camel, when well fed and supplied with water at starting, can accomplish immense journeys on the most meagre fare, and without finding it necessary to drink. In extreme cases it can go thirteen days [1] without water, and frequently it does so for three or four days. By no other animal is so much merchandise carried such long distances. It is the sole means of commerce between the oases of northern Africa, as well as between the north African coast and the fertile territories of the Sudan, and is largely employed in western Asia. It has also been introduced into Australia, where it has been employed in exploring the interior. The camel has been called 'the ship of the desert'; but, however appropriate this appellation may be in many respects, it is important to bear in mind that the load carried by a camel is only equal to that of a very small boat. In most parts of the domain in which the single-humped camel is in use, that is, in north Africa and western Asia,[2] including Persia, the load is as a rule from about 330 to 450 lbs., but larger loads are reported from north-west Africa. In Morocco camels are loaded according to their strength, with 'small loads' of 4 cwt.,[3] or 'big loads' of 6 cwt., and in the Senegal region, specially fed camels sometimes carry loads up to 1,300 lbs.[4] ($11\frac{1}{2}$ cwt.). The load of the Bactrian or two-humped camel, whose original domain is in central and eastern Asia, is from 700 to 1,000 lbs. or more. At

[1] F. L. James, *The Unknown Horn of Africa*, p. 105.

[2] In ancient times the two-humped camel is regularly represented on coins in Asia Minor (*Geog. Jour.*, xx., pp. 280, 281).

[3] Private letter from Mr. J. M. MacLeod, long H.B.M. Consul at Fez (see also *Geog. Jour.* lii., p. 96).

[4] *Annales de Géog.*, xxvii., p. 358.

what would seem to be the more ordinary load it would thus require more than 5,000 camels to carry a burden equal to that of a ship of 1,000 tons. As a matter of fact, a camel caravan usually consists of from one to ten thousand camels, the journey across deserts being made in such large companies, not only for the sake of carrying a large quantity and variety of merchandise, but also for the sake of having a sufficiently large body of men to defend the caravan against the robbers by whom deserts are usually infested. And robbers are not the only danger to which caravans are exposed. The scorching sand-storms which sometimes occur are equally distressing and perilous. The route, in many places marked by small heaps of stones, is often, when lost, difficult to find. The ship of the desert is, in fact, even more liable to be wrecked than the ship of the sea. Thousands of corpses along the route from Fezzan to Bornu, the shortest of all the routes from the oases of northern Africa to the fertile regions of central Sudan, speak eloquently of the perils of desert navigation.

135. The simplest method of making use of animals for transport is to employ them as beasts of burden, like pack-horses, sumpter-mules, and baggage-camels; but this method is far from being the most efficient. An immense advance is made when animals are employed to draw wheeled carriages. Camels can drag a load about four times as heavy as they can carry, even where there are no roads. Even in roadless, difficult country as in South Africa, teams of oxen yoked to strongly-built wagons are much in use. For the most part, however, the use of wheeled carriages involves the making of **roads**; and, notwithstanding the perfection to which this art was carried by the **Romans**, it is a fact rather difficult for us to realise nowadays that it is only within the last 125 years that, on account of the wretched state of the roads, it took two days and three nights' incessant travelling to get from Manchester to Glasgow (Robert Owen in 1795). About fifteen years before that Arthur Young inveighed against the roads as execrable in many parts of England. In Suffolk he describes one with ponds of liquid dirt, and a scattering of loose flints just sufficient to lame every horse that moves near them. In Lancashire he measured ruts four feet deep.[1] Such facts as these help us to appreciate the improvements in road-making introduced about the end of the eighteenth century by **Telford** and **Macadam.**

136. In considering the facts just referred to, it must, moreover, be borne in mind that England is a country with special advantages for road-making. In the first place, good road-making material is abundant; great marshes have long been drained. It is difficult, therefore, for us to picture to ourselves the condition of the countries in which communication is hindered by marshes hundreds of miles in extent, as in western Siberia and in Hungary, or those in which there are still vaster plains destitute both of stones and timber (**1043**). Secondly, the

[1] Smiles's *Lives of the Engineers*: Metcalfe and Telford, pp. 65, 68, 246.

physical configuration of England places few difficulties in the way of laying roads in any direction. The importance of this consideration may be perceived to some extent even in the British Isles. A map of Scotland which shows at once the roads and the physical features makes plain to the eye how the surface configuration has governed the direction of the roads, but nothing in the British Isles can give any but a faint idea of the obstacles to communication that arise from this cause elsewhere. Across the Himalayas there is at least one **mountain-pass,** regularly used for trade, upwards of 18,000 feet above sea-level, and deeply buried in snow even at the height of summer. Some of the passes of the tropical Andes exceed the height of 15,000 feet, and the principal pass across the Chilean Andes, in about 33° S., attains a height of between 12,000 and 13,000 feet (**1358**). In the mountainous region separating the north-west of India from Russian Central Asia, some of the roads lead through narrow rocky gorges, in which passage is afforded by balconies supported on timbers let into the face of the rock, some of the balconies being so long that they oscillate threateningly under the feet of the passer-by. On such routes also robbers are apt to abound (**1039**).

137. The advantages for transport of **railways,** smooth hard roads, to use the description of them given by Stanley Jevons, as compared with ordinary carriage-roads, are so obvious that it is unnecessary to enlarge upon them. One fact may be mentioned by way of illustrating the extent of the revolution brought about in modern commerce by the introduction of railways. Whereas wheat could be profitably carried in the latter part of the last century by rail and water a distance of 15,000 miles from the United States to a European seaport, it could rarely be grown with profit west of Lake Michigan, more than twenty miles from a railway.[1] Railways were indeed the means by which bulky loads of relatively small value could first be conveyed long distances by land where there were no good inland waterways. On that account they were the means by which good ordinary roads could first be made in regions deficient in road-making material. On that account too, it was they that rendered possible the enormous cheapening of carriage by large-scale transport, for they are necessary for the provision of cargoes for large ships.[2] A very few further remarks under this head will suffice. It may be worth while to point out that railways, as we know them, were not altogether a sudden revolution in the mode of transport. Like so many other important inventions and discoveries they were led up to by previous inventions. Railways preceded steam-railways, steam-engines preceded steam-locomotives. The first iron railways were made for horse-carriages or trucks used in

[1] This was stated in the report on the United States census of 1880.

[2] In these post-war days one result of this is seen in the greatly diminished utility of the merchant fleet of the world in consequence of the delays in part due to railway congestion.

connection with coal-pits. The patents for Watt's inventions by means of which the steam-engine of modern industry was introduced were taken out between 1769 and 1782, but it was not till 1801 that Trevithick built the first locomotive or rather road-motor driven by steam, and not till 1813 that Hedley and Stephenson, independently of each other, constructed the improved railway locomotives, from which the modern forms are descended by further improvement. The first steam-railway for general purposes was that between Stockton and Darlington, opened in 1825. The Liverpool-Manchester line followed in 1830. In the next year ran the first passenger train on the American continent—from Albany to Schenectady in the State of New York; and in 1835 was opened the railway from Brussels to Malines, the first on the mainland of Europe.

138. On the **routes of railways** the structure of the country has in some respects an even more marked effect than upon those of roads; but the circumstance just alluded to, the superior utility of railways when once made, has in many cases justified a greater expenditure in subduing the face of nature in order to make routes for railways where the features of the country did not afford them. Hence it is that railways, besides being made to climb the Andes to the height of 15,600 feet,[1] have been pierced through the Alps in tunnels of from seven to above twelve miles in length. Hence it is too that railways do not always follow the routes of well-known roads—that the railway across the Cheviots for instance, does not follow the course of the old road connecting the valleys of the Rede and Jed across Carter Bar; that the railway from Florence to Bologna does not follow the old direct route across the pass of La Futa, but deviates along the base of the Apennines to Pistoja, in order to ascend the valley of the Ombrone and then pass by a tunnel to that of the Reno. It has been estimated that when a railway gradient rises to as much as 2 per cent. the working costs for a given train-load per mile of railway are as high as for two miles on the level.[2] In mountainous countries the construction of railways has been greatly promoted by the adoption of **rack-railways,** and more particularly the modification known as the **Abt system,** in which the locomotive can use the rack or toothed rail on steep mountain tracks (even with a steeper gradient than 1 in 2), and on level tracks can proceed in the ordinary manner. The first mountain rack-railway was that up Mt. Washington in New Hampshire, U.S., designed by Marsh and completed in 1868. In order to extend the facilities for communication by rail without break of bulk even wide stretches of sea and lake are in some cases not allowed to interrupt the railway transport, **train-ferries** (**662**) being employed to transfer trains on vessels with rails on their decks. (See also **211, 908.**)

[1] A tunnel has been made at this height for the Lima-Oroya railway.
[2] Hassert, *Allgemeine Verkehrsgeographie* (1913), p. 34, n. 1, on the authority of F. Heiderich.

139. Geographical factors affect in various ways the working of railways. It is obvious that a railway locomotive must haul the vehicles containing the load as well as the load that has to be transported, but it is only the load on which freight is earned. Hence it is desirable to have a railway wagon as light as possible in proportion to the paying load. Large wagons present this advantage, so that the use of large wagons is economic where sufficient loads can be regularly obtained for them. Moreover there are obvious savings in long heavy trains, in place of several shorter and lighter trains, where the heavy trains serve the purposes of the traffic. But it will be observed that both of these last statements are qualified by a clause beginning with 'where.' It is not everywhere that you have convenient loads for large wagons and long heavy trains. Where there is a large amount of bulky goods such as grain, coal, ores, and timber to be conveyed to single points the advantage of large wagons is great, and it is greatly enhanced when there are such loads in both directions. It is said that the idea of reducing transport expenses by the adoption of larger wagons originated in the grain-growing regions of the north-west of the United States. Much has been said for many years on the advantage of introducing large railway wagons into Great Britain, but it is often apparently forgotten that the conditions there are in a large measure different. Where wheat is grown in enormous quantities in comparatively small areas in Manitoba or Minnesota, and a large proportion of it has to be transported to one or two great markets, the problem is entirely different from that of collecting wheat in forty or fifty counties and redistributing it in ten thousand towns and villages. In America it has been found profitable in some cases to use 50-ton steel trucks, nowhere more advantageously than on the lines connecting Pittsburgh (**1302**) with the lake ports, where the trucks can be filled in one direction with iron ore, in the other with coal.[1] Trucks carrying more than 80 tons of 2,240 lbs. have been designed for the carriage of Pocahontas coal (1299) to deep water near Norfolk, Va. Trucks smaller than those in ordinary use in America but much larger than the familiar trucks of Great Britain are employed on the continent of Europe. A London railway official who was good enough to discuss this matter with me stated that the system with which he was connected had from 500 to 600 goods stations, and that to nearly every one of these a truck was sent every night, but in many cases those trucks carried only from half a ton to two tons. The advantage of constructing 50-ton 'cars' for such loads is not obvious. In certain cases no doubt the adoption of larger railway trucks must be an advantage even here. Several British railway companies have already made experiments with 20- to 40-ton trucks, but not in every case with the good

[1] There it was estimated that the substitution of these trucks for the older 30-ton wooden ones effected a saving of 315 tons dead weight on a 1,500-ton train, and one of nearly £9,500 in freight on 30 double journeys in the course of the year.

results hoped for. In other cases it is to be regretted that the original construction of the line (as to dimensions of tunnels, turn-tables, &c.) does not admit of the experiment being made without excessive expenditure.

140. Where the conditions favour heavy traffic, great savings can be effected by having **long trains** even though these may be made up of small trucks, but the savings of course are all the greater where there are long trains of large trucks.[1] Long trains also are more common in America and on the continent than in Great Britain, and for the same reasons as large wagons. Still manifestly the traffic between a great port like Liverpool and a great consuming centre like London presents opportunities for long heavy trains, and to take greater advantage of those opportunities three of the railway companies running between those places have entered into a pooling arrangement. It is also to promote this economy that certain railway centres, in America known as **basing-points,** are made the foci of railway traffic for large districts round, goods being carried between these points at exceptionally low rates, and the rate being thus cheapened for the whole district served from any focus. At such centres, as for example, at Crewe in England, extensive marshalling sidings for the redistribution of the wagons are necessary. The difference between British and American railway management in respect of train-loads and size of wagons appears to arise principally from two causes. One is that already referred to, the marked distinction between the manufacturing and agricultural regions of the country. This causes the manufacturing regions of the United States to bear the same relation to the agricultural regions as Great Britain bears to the world at large, and as this relation in the case of Great Britain has given rise to big ships, so in the United States it has given rise to heavy train-loads, so that the density of traffic in tons—that is, the average quantity of goods carried per mile of railway—in America would appear to be considerably greater than in this country.[2] The other cause is a difference in time requirements in the two countries, and that again, while partly a matter of custom, British consumers being habituated to demand quick service, is largely the result of differences in available space. In America goods are often detained for a considerable time at certain stations till large train-loads can be made up for particular destinations. This involves more extensive marshalling than can be easily provided in our overcrowded country. The local railway service of Great Britain nevertheless would appear to compare favourably with that of the United States even in respect of rates of freight. An American writer on transportation maintains that 'American railroads make local

[1] On one occasion a train $1\frac{1}{4}$ miles long, composed of 120 steel cars each with a capacity of 100,000 lbs., with a total capacity therefore of more than 5,350 tons, carried coal from Altoona to Pittsburgh, Pennsylvania.

[2] See W. M. Acworth in *Economic Journal*, xv. (1905), pp. 556–7, and xxii. (1912), p. 594.

freights pay for the trouble of handling grain at a low profit.'[1] As to heavy trains in relation to geographical conditions see also **21** and **22.**

141. The construction of **light railways,** by which are usually meant railways so constructed as to involve comparatively small original cost and outlay for upkeep, has been carried on in France since 1865, and in other continental countries as well as the United States from later dates. The Belgian system, begun in 1885, is one of remarkable completeness, utilising, to a large extent, the country roads. In 1896 an act was passed in this country authorising and regulating the construction of light railways, but including under that head railways made in the same style as ordinary railways, and in which the only economy was in the procedure under which powers were obtained to construct the railways. These, it was hoped, would, among other advantages, have that of assisting the economical transport of agricultural and garden produce. So far that act has not had all the effects looked for. Many, perhaps most, of the light railways so far constructed serve, like tramways, more for passenger traffic than the carriage of produce.

142. The assimilation of tramways to certain light railways has been accelerated in recent years by the application of electricity as the motive power, which facilitates the extension of tramways. In this, as in other applications of electricity, it is admitted that this country is now far behind other leading industrial countries, but British engineers contend that this is mainly, if not entirely, due to adverse British legislation. It is contended that down to 1882 Britain was in the van under this head, but an act passed in that year authorising local authorities to purchase any electrical installation at the end of twenty-one years without making any allowance for goodwill had such a deterrent influence on investors that other countries shot ahead. The term was extended in 1888 to forty-two years, but the powers which local authorities have over the use of the streets enable them in many cases still to block the way of private enterprise.

143. The development both of light railways and tramways has, however, come to be hindered by the rivalry of **motor vehicles,** which have the advantage of being able to make use of the ordinary roads, though in many cases necessitating improvement in their construction. They thus have in a much higher degree one of the advantages of railways over canals (**146-148**), that of facilitating direct intercommunication between different parts of the country, a fact which may be expected to promote a considerable amount of redistribution of manufacturing and perhaps also agricultural industry. Such vehicles are at present mostly driven by petrol engines, though many make use of steam.[2] For certain classes of goods they have an obvious advantage even over railways through being able to collect the goods at the place

[1] Emory R. Johnson, *Inland Waterways: their Relation to Transportation*, p. 66.
[2] During the war, owing to the dearth of petrol, coal gas was largely used.

of production and deliver them direct to the consumer. Under certain conditions trailers are allowed to be dragged behind the motor vehicle, and in what is known as the **Renard train,** in which a rotating shaft with flexible joints conveys the power direct from the motor-vehicle to a pair of wheels in each of the vehicles behind, a light motor is capable of drawing a train of three or four vehicles at considerable speed over any ordinary road.

144. In passenger traffic a striking development has been the introduction of the so-called monorail. In one of the systems so called the locomotive and carriages are placed astride of a single elevated rail, which is the sole rail supporting the weight of the train, though it is at the same time steadied by two small side-rails. A railway on this system has existed for some years between Listowel and Ballybunnion in the south-west of Ireland, but the great advantages expected from its adoption are in connection with the traffic between great centres of population. In such cases it is asserted that a speed of 100 miles an hour or more by this system can be economically attained. In 1901 an act was obtained for the construction of such a railway between Manchester and Liverpool.[1] Through the long double town of Elberfeld-Barmen, where building space is restricted by somewhat steep hills on both banks of the Wupper, runs a mono-rail on another system. In this case the carriages are suspended from a single rail over the river supported by struts rising from the opposite banks.

145. For traversing rough or steep ground or for lifting **ropeways** and **cableways,** which are essentially similar contrivances, are of great advantage. In both there is an aerial rope to which buckets are suspended, but in the ropeway the rope moves with the buckets, in the cableway the buckets may be drawn by other ropes but hang on a stationary cable. A cableway demands little roadway. It can, in fact, be carried over fields and pasture-lands without interfering much with agricultural operations; and it can easily be constructed over uneven ground, and even across streams, as well as less formidable obstacles. In a cableway a single load may amount to as much as eight tons. Where the cableway is worked and controlled electrically the system is known as **telpherage,** and in this form it is due to Prof. Fleeming Jenkin in combination with Profs. Ayrton and Perry. In this system the loads are small, the maximum about one ton, but the buckets carrying the loads may follow one another at the rate of three a minute. The first telpher line in England was opened in October 1885 at Glynde, in Sussex. It is rather less than a mile in length. One about 12 miles in length has been constructed to carry coal from Savona across the Col dell' Altare to San Giuseppe di Cairo, the junction station for Milan and Turin. The pneumatic transmission of telegrams in light boxes through tubes by increasing the atmospheric pressure or diminishing it (by suction) was adopted as far back as 1853,

[1] **So far (1921) this railway has not been constructed.**

and in 1913 the system was extended by the London post-office to parcels.

146. Water carriage has within the last hundred years undergone as great a revolution as land carriage. The simplest form of water carriage is that in which **rafts** are allowed to drift down the course of a river. The use of boats on rivers, both for down- and up-stream navigation, must, however, have been one of the earliest of human inventions; and in some parts of the world, as in Russia and the valley of the Ganges, the want of roads was long to a large extent made up for by the abundance of navigable rivers. Such rivers being means of transport given wholly or largely by nature are apt to have their importance exaggerated in the minds of geographers, but it should now be recognised that nature has generally done more for a country in providing it with facilities for railway construction than with navigable rivers, in so far as these are merely inland waterways and not, so to speak, extensions of the seaboard that is directly accessible to sea-going vessels. Railways have the advantage over rivers not merely of greater speed but the even greater advantage of intercommunication with different parts of the country, and these advantages in most cases more than compensate the disadvantage of dearer haulage for low rates of speed (**148**). And with respect to intercommunication with different points, it is important to note that a railway generally has a great advantage even over a river on a parallel course. A waterway is of no use unless there are places on it where goods may be landed and lifted, but good navigable rivers are apt to flow for long stretches through marshy and unstable country without landing places. It is this character that greatly diminishes the value of the Po as a waterway, and the Mississippi flows in places for mile after mile without the possibility of discharging goods, where the parallel lines of railway have numerous stations. The utility of a river as a waterway is moreover diminished through the accidents of the weather to a much greater extent than that of railways. Nearly all rivers are subject to great variations in level. The St. Lawrence is in this respect an exception, as the steadiness of its flow is maintained by the chain of great lakes of which it is the outlet, but it is a unique exception. Hence traffic on most rivers is apt to be stopped or impeded by high and low water, high water rendering them unnavigable on account of their impetuosity, low water from inadequate draft. Then again where the winter climate is severe there is a regular stoppage of traffic through ice. Nevertheless large rivers on which steamers can be used still form important means of communication (**827**), and especially in countries not yet fully opened to modern commerce. The best of such rivers have one great advantage over railways, that it is easier on them to transport great quantities at one time. In the note to paragraph **140**, a train-load of less than 5,500 tons is mentioned as something quite exceptional if not unique, but on the Rhine, for instance, it is

easy to exceed that in barge-trains. If they served no other purpose they would still be of commercial value as tending to keep down rates on competing lines of railway (**814**). See also **114, 116, 194, 198.**

147. Navigable canals are another means of transport dating from the unrecorded periods of human history, and they also have had their importance diminished by the introduction of railways, though in some regions they have played a very important part in the development of commerce (**1282**). Level countries and regions are naturally those which abound most in canals, and in such, one of the chief uses of rivers is to feed navigable canals, as in more mountainous districts one of their chief uses is to afford water-power. The most important canals of modern times, however, are the **ship-canals** already constructed or in progress, connecting different seas.

148. Somewhat delusive expectations of economy in transport from the use of inland water carriage are sometimes entertained. These are all based on the admittedly low cost of mere haulage at a slow rate. It is estimated that on an ordinary good wagon road a single horse-power will drag about 3,000 lbs. at the rate of 3 feet per second ; on a railway about 30,000 lbs. at the same rate ; in water up to as much as 200,000 lbs. But in making inferences from this general fact it should be borne in mind (1) that the cost of increasing the rate of speed is much greater by water than by land ; (2) that the average rate of transport on canals is greatly reduced by the delays at locks ; (3) that the economy of water transport is greatly reduced by the fact that even canals do not afford the same facilities as railways for conveying goods over the face of the country without break of bulk ; and (4) that canals are in most cases of too small dimensions for modern requirements.

149. With regard to the first of these points it is noteworthy that some of the earliest experiments with steamboats were made with the view of increasing the speed and economy of transport on canals. Since the screw propeller was introduced, these experiments have been renewed with greater success, seeing that its use is not so likely to injure the canal banks. Inasmuch, however, as a great part of the difficulty of developing higher rates of speed in water transport arises from the fact that so much of the power of the propeller is lost in its passing through the water, it is somewhat surprising that so few attempts have been made to increase the speed by the use of locomotives on the canal banks. Experiments in this direction are indeed old. This mode of traction was tried on the Forth and Clyde Canal in 1839, steam locomotives being used. More recently electric motors running on rails on the banks have been employed both in France (on the Burgundy Canal) and Belgium (on the Charleroi Canal) ; but in the latter case the experiment has been abandoned.[1]

[1] The use of aerial motors for the traction of canal barges has been suggested. These would have the advantage of neither disturbing the water of the canal nor making demands upon the towing-path.

150. In view of the importance of the second consideration above mentioned, the map of the English waterways has been drawn up so as to show the number of locks. The delays due to this cause have given rise to various projects for economising time in surmounting differences of level in inland navigations. Hydraulic and pneumatic lifts are employed. Since 1875, an hydraulic lift, with a lifting power of 100 tons, working through a height of 50 feet, has connected the Weaver navigation at Anderton, in Cheshire, with the Trent and Mersey Canal. One of more complicated structure, with a capacity of nearly 600 tons and a somewhat higher range of working, was completed in 1899 on the Dortmund-Ems Canal at Henrichenburg not far from Dortmund. Inclined planes have been employed from a very remote date in China. In April 1910 the Grand Junction Canal substituted inclined planes for the flight of ten locks which formerly overcame a height of 75 feet at Foxton in Leicestershire. The boats ascended and descended inclined planes simultaneously in wet docks which moved up and down on rails, a stationary steam-engine effecting the lift. By this means two boats were moved up and down simultaneously in 12 minutes, while formerly one hour and 20 minutes was required for passing a couple of boats in either direction.[1]

151. The difficulty of intercommunication by inland waterways without break of bulk arises from the fact that it is not practicable to construct canals in as many directions as railways, and the full advantage of such intercommunication, even where it is possible, can in many cases not be enjoyed, owing to the inevitable differences in canal dimensions. The larger the waterway the greater is the economy in the transport, but the construction of large canals is in many cases quite impracticable, in many others not economically practicable. Such differences have also militated against the working of different canal systems in co-operation with one another.[1]

152. A striking illustration of the advantage of railways over waterways is to be found in the carriage of Russian petroleum, which is conveyed up the Volga from Baku, only as high as Tsaritsyn, where it is transferred to the rail.[2] A bulky, non-perishable commodity like petroleum would seem to be peculiarly suited to water-carriage, but various circumstances no doubt combine to give the advantage to the railway. First, there are the superior facilities for intercommunication just spoken of; second, there is that of quicker delivery; and, third, there is in Russia the advantage that the railways are available during the winter when the rivers are not, and the bulk of the distribution takes place during that season from the points of summer storage.

[1] The Grand Junction Canal at one time had agreements with other canal companies allowing of the quotation of through rates to Birmingham and to the Nottinghamshire and Derbyshire coalfields, but these led to no increase of traffic, and the latter agreements have been given up. The Foxton lift was closed in November 1910, as there was not enough traffic to warrant the cost of working it.

[2] Sir Boverton Redwood, *Treatise on Petroleum*, ii., p. 158.

153. Marine navigation is the mode of navigation which notoriously presents the greatest combination of advantages. Besides the advantage of cheap haulage for low speeds offered by navigable water generally, the ocean offers a free road traversable in all directions, one on which it is possible to increase indefinitely the size of vessels, and on which wind power can be more extensively used for propulsion than on land. These advantages far outweigh the greater risk of loss at sea than on land from storms and other causes. It is in this mode of water carriage that the most important developments have taken place in modern times. These developments affect the size of the vessels employed, the range of navigation, the precision with which a course can be laid down and followed, and the power used for propulsion.

154. The navigation of the sea **in small boats** for trade purposes is not yet quite extinct. The islanders of the Pacific Ocean and the Eastern Archipelago undertake short voyages in a great variety of small boats, and some of the islanders in the trade-wind region of the Pacific regularly set out in fleets of small boats on long expeditions, in which they go far out of sight of land, guided only by the direction of the low waves which constantly prevail in these regions owing to the action of the steady wind.

155. Such adventurous enterprises unaided by the modern appliances for navigation are, however, the exception. In ancient times the Phœnicians were the most adventurous seamen, at least in European waters. About 1,000 years B.C. their vessels traversed the entire Mediterranean, and even went beyond the Pillars of Hercules (Straits of Gibraltar), possibly as far as the Scilly Isles, and about the beginning of the sixth century B.C. Phœnician seamen in the employment of Pharaoh Necho, King of Egypt, are credited with having made a voyage round Africa. But the most adventurous of their expeditions were mainly coasting voyages. Ancient writers of the first century A.D. mention as something recent the discovery of the use that could be made of the monsoon winds in sailing from the mouth of the Red Sea to India at one period of the year and back at another. It is at least certain that a trade of this nature was regularly organised within that century, but even these voyages were probably not wholly on the high seas. Before the close of the middle ages, however, vessels sailed with the monsoons from the east coast of Africa direct to India and Ceylon.[1]

156. In modern times ocean navigation has been greatly facilitated by the use of the **mariner's compass.** This instrument, there can be no doubt, was known to the Chinese at a much earlier date than to Europeans. So far as can be ascertained, it was first known in Europe towards the close of the twelfth century. The Neapolitan Flavio

[1] See *Proc. R.G.S.*, 1882, paper by Col. Yule on 'The Oldest Records of the Sea-route to China.'

Gioja (with doubtful warrant) gets the credit of having improved it in the fourteenth century, and since then it has undergone a long series of improvements, especially in the nineteenth century, when the increasing use of iron in shipbuilding has rendered it necessary to devise methods for neutralising the disturbing effects of that metal on the compass needle.

157. It was not till sailors became accustomed to this instrument that they became bolder in their ventures. The Portuguese voyages in the fifteenth century, which added greatly to the knowledge of the west of Africa, were still for the most part coasting expeditions. It was in the last decade of that century that Columbus discovered America (1492), and Vasco da Gama the sea-way to India (1497–98)—a discovery hardly less important in the history of commerce, on account of the effect it had on the fortunes of the great trading centres of Italy and southern Germany (**215**).

158. For hundreds of years after the first use of the compass in Europe mariners were still without the means of determining with precision their course on the high seas. Improved **chronometers,** almost as indispensable for this purpose as the compass, date only from 1736.[1]

159. Steam navigation, by which so great a revolution has been effected in sea-carriage, originated, like steam railways, in the nineteenth century. Trials of steam-engines for the propulsion of vessels were, indeed, made before the end of the eighteenth century. But the patent for the first steamboat which proved a success, so far as locomotion was concerned, was taken out in 1801 by Symington, and a boat constructed on this patent had a few trials on the Forth and Clyde Canal. The first really successful steamboat voyage was that made in 1807 from New York to Albany on the Hudson in a vessel constructed by Fulton, who had worked independently on the problem of steam navigation since 1803. In 1819 a ship crossed the Atlantic using steam as an auxiliary, and in 1838 two ships sailing about the same time from Cork and Bristol respectively, made what are considered the first commercially successful steam-voyages across the Atlantic. In 1820 an iron vessel made a voyage from London to Paris, and in 1832 the first ocean-going vessel, the *Elburkah,* made the voyage from Liverpool to the Niger. The subsequent history of shipping has shown a constant increase in the proportion of steam- to sailing-vessels in the shipping of the world, along with an increasing use of iron and steel, at the expense of wood, in ship-building.

160. It was about the middle of last century that steamers began somewhat rapidly to displace sailing vessels, and in the sixties that iron came to be more and more substituted for wood as the building material. The invention of mild steel (**523**) made it possible to use

[1] For particulars as to the best performances of commercial sailing vessels in respect of speed, see Lubbock, *The China Clippers,* 1914.

steel in place of iron, and this material was first made use of in the Cunard liner *Servia* in 1881. The great advantages of iron or steel vessels over wooden ones are their greater strength, endurance, and lightness in proportion to the load. Wooden vessels seldom lasted for more than 12–15 years, whereas the life of an iron vessel may exceed 40 years.[1] The weight of a wooden ship was nearly as great as that of its cargo, whereas an iron or steel vessel can carry a load of from two to four times its own weight, river steamers, which are not so strongly built, an even larger proportion.[2] Obviously the proportion must be much greater in sailing vessels than in steamers, in which latter a much greater amount of room is required for the relatively large crews as well as for the machinery and the fuel (162). This is one reason why the sailing vessel is still built for certain purposes (**171**). But in spite of this disadvantage on the part of the steamer, the greater speed of the steamer makes its carrying capacity in the course of a year so much greater than that of the sailer that in comparing the shipping tonnage of different countries it is usually considered right to calculate the net register tonnage[3] of steamers as equal to four times, or nearly four times, the same tonnage of sailers. In recent years the introduction of **reinforced concrete,** that is, concrete strengthened internally with steel rods, as a building material, and of fabricated ships has had some influence on the local distribution of the shipbuilding industry. Concrete ships of upwards of 1,000 tons burden were constructed in large numbers during the war, when the saving of steel was important. **Fabricated ships** are made up of parts which may be manufactured like bridges, at inland steel works, and put together at the seaboard. This also is very largely a war development.

161. Together with the changes mentioned in par. **159** there has taken place a steady increase in the size and speed of vessels, especially passenger vessels, built for the great routes of commerce, and it is another advantage of iron or steel as compared with wood that it is better adapted for the building of large ships. The ships in which the great voyages of discovery were made in the fifteenth and sixteenth centuries were, according to our standard, very small. The largest of the three caravels with which Columbus discovered the New World

[1] Hassert, *Allgemeine Verkehrsgeographie* (1913), p. 260.

[2] Pollock, *The Shipbuilding Industry* (1905), p. 40; Emory R. Johnson, in the *Annals of the American Academy of Political and Social Science*, 1893, p. 77; the same, *Ocean and Inland Water Transportation*, 1906, p. 37; Von Kurs, in *Die Weltwirtschaft*, I Jahrgang, II Teil, 1906, p. 187.

[3] A register ton of shipping is 100 cubic feet of internal space, and the net registered tonnage is the cubic contents calculated according to certain rules, differing, unfortunately, in different countries, with the omission of the space required for the crew, the machinery, and the fuel. A freight ton, according to which freight rates are charged, is either 40 cubic feet or 1 ton in weight, the goods measured by weight and bulk respectively being determined by the shipowners. In the Indian trade returns 50 cubic feet, or half a register ton, which is the same as the cubic content of a load of timber, would appear to be the measure used (Cd. 7,766, p. 88).

was of only 100 tons burden. Frobisher effected his discoveries in 1576 with a ship of 25 tons and a pinnace of 10 tons, and Drake in 1577 set sail on his voyage round the world with five ships, of which the largest was only 100 tons. But we must not be misled by these figures as to the average dimensions of the merchant vessels of the period. Small vessels were often purposely chosen for voyages of discovery, as being better fitted for the exploration of unknown coasts. Even in the twelfth century, an average-sized merchantman in the Mediterranean appears to have had accommodation below deck for about 250 tons of cargo, besides a considerable cargo above deck. Nowadays, steamers are built of more than 10,000 tons burden; and so greatly has the speed been increased, that the voyage from Sandy Hook (New York harbour) to Queenstown has been accomplished within five days, and that from London to Adelaide within four weeks.[1]

162. The increase in the size of steamers has been a necessary result or condition of the increase of speed, for the more rapid rate of progress has been achieved, to a large extent, at the expense of an increased consumption of coal; so that on a long voyage a large amount of space is required merely for the accommodation of the fuel. But the higher speed is not solely due to this cause. Improvements in the construction of marine engines have in some cases given increased speed with economy of fuel; and among these improvements, the most important is the invention of the tri-compound or triple-expansion marine engine, in which the steam is passed in succession into three cylinders, so as to act on three pistons and utilise its expansive force to the utmost. By such improvements the consumption of fuel had in 1897 been reduced since the early days of steam navigation from between 5 and 7 lbs. to about 2 lbs. per indicated horse-power per hour. In recent years the steam turbine has been applied in marine engines. In such engines the steam, instead of acting on opposite sides of a piston reciprocally, is made to impinge continuously on a series of blades fixed to a revolving drum. By such an engine a speed of upwards of 36 knots an hour was attained on torpedo-destroyers in 1918. Here also may be noted the increasing use of oil-fuel and Diesel oil-engines in ocean-steamers, and of petrol motors on inland waterways, as well as barges propelled by tugs at sea. Many advocate the sole use of oil-fuel in the navy, and in June 1920 two of the largest ocean-liners were equipped for its use, for though oil is dearer than coal it presents in addition to other recommendations the great advantages at sea of

[1] The largest vessels yet built (1921) are the Hamburg-America liners the *Imperator*, of 50,000 register tons, and its sister ship the *Vaterland*, of 55,000 tons. The fastest large ship is the Cunard liner *Mauretania*, which has attained a speed of 26·6 knots per hour, and has made the voyage from Sandy Hook, New York, to Queenstown, Ireland, in 4 days 14½ hours. To develop such a speed the consumption of about 1,000 tons of coal per day is required. See also paragraphs **691** and **843**. Ordinary cargo steamers ('ocean tramps') of larger size are built with a cargo capacity (dead weight) of 5,000 to 9,000 tons, and to run at a speed of 10 to 11 knots.

requiring much less space (little more than half that required for coal), the getting rid of stokers and the consequent reduction of the crew by about 50 per cent., and a great reduction of the time required for replenishing the fuel supply.[1] Trains of barges have been used to convey timber to England from the Baltic, and coal from the United States to the West Indies.

163. One consequence of all these improvements was in pre-war days the reduction of freights, and another is the increase in the size and depth of the harbours belonging to the great seaports, or the establishment of outer ports for the accommodation of vessels unable to reach older ports in the neighbourhood. While such changes are brought about, it is obvious that in the competition between different countries, a great advantage belongs to those which are rich in deep and capacious natural harbours, or such as require least outlay to adapt them to the requirements of the present day.

164. Another less obvious but very important consequence of the same improvements has been an incalculable increase in the security of sea voyages. This has been brought about in two ways. First, the large vessels and especially the large steamers of the present time are much less liable to be wrecked by storms than the smaller vessels of past days. Second, it is the large modern steamer that has made it possible to sweep pirates away from the sea, a service to which the world is indebted chiefly to the British navy and mercantile marine. People who are acquainted only with present conditions cannot but be astonished on learning of the losses that formerly took place on ocean voyages. Of the 86 ships sent to the East by the English East India Company in the first 21 years of its existence (1601–21) only 36 returned with cargoes, the others having been captured, lost, or become worn out.[2] In the ten years 1590 to 1599 33 large carracks left India for Europe, but of these only 16 reached Lisbon. On the route from India to Japan at that time we are told that out of nine starting on the three years' enterprise, only four might be expected to return. The average life of a carrack is given as apparently about three years.[3]

165. OCEAN TRADE ROUTES. Goods are conveyed by sea from any seaport from which it is possible to obtain goods which can be sold at a profit elsewhere. But the route by which the goods are conveyed to their ultimate destination depends on many circumstances, some connected with the nature of the commodities, some with the mode of conveyance—that is, whether by sailing vessel or steamer—

[1] One of the liners above referred to, which would have required several days to bunker with coal, was supplied with oil at New York for its return voyage to this country within 20 hours.

[2] Colquhoun, *Resources of the British Empire*, 2nd ed. (1815), Appendix, p. 6.

[3] W. H. Moreland, *India at the Death of Akbar*, pp. 234, 238, 289. What is believed to be the oldest marine insurance policy in existence, dated February 1656 (1657 of our calendar year), shows a rate of 5 per cent. on a voyage from Macassar or Bantam to London (*Lloyd's List*, Sat., July 2, 1921, Supp.).

and all, of course, connected with the relative situation of the place of origin and the destination of the commodities.

166. To understand how the nature of the commodities carried affects the route, two important considerations must be borne in mind. First, it causes expense to transfer goods from one vehicle (whether ship, railway wagon, or cart) to another. It is therefore an advantage to convey goods directly from the port which serves the district where the goods are obtained to that which serves the district in which they are ultimately sold. But, second, it is cheapest to convey goods in the largest possible vessels, provided that those vessels can be filled. This frequently makes it cheaper on the whole to incur extra costs in unloading and reloading (handling expenses), and send goods first in smaller quantities to a great port, from which they are sent in large vessels to another great port, from which again they may be sent by sea to some other port nearer their final destination.

167. It is bulky goods, and especially such as involve great labour in handling, like coal, timber, ores, and clays, that are most likely to be carried direct, for the quantity of such goods that may be required in a small district may be enough to fill a larger or smaller ship, and thus bring about the greatest possible saving in handling. That is why so many small British and Irish seaports import timber directly from abroad, why so many British seaports export coal sometimes in small vessels, and why so many small foreign seaports receive British coal, why small ports in Cornwall and Devon send off entire cargoes of china and other clays, why small Welsh ports fill vessels with slates for many destinations, and why comparatively small fishing towns in England and Scotland receive in separate ships cargoes of ice and send out ships laden with barrels of herrings. Such bulky articles as those above named are often useful as return or ballast cargoes, helping to reduce the freight charge in one direction by forming the whole or part of a cargo in the opposite direction. The importance of coal to British commerce in this way has often been emphasised, but salt, cement, clays, and even bricks also aid British commerce in the same way. China clay sometimes serves as a return cargo from England even to the United States. Though in value bricks form an absolutely insignificant article of export from the United Kingdom, the weight of bricks annually exported before the war was probably one-fourth or one-fifth of the weight of cotton piece goods exported. It was return cargoes of wood-pulp and other timber products that favoured the rise (perhaps only temporary) after the war of an export trade in coal from the United States to Sweden. Such considerations give much interest and significance to the table in the Appendix showing the price per ton of a large number of British imports and exports.

168. On the other hand, the economy of carrying in large ships explains why tea, coffee, spices, and other commodities sent from the East to the United Kingdom come almost entirely first to London, it

may be in ships that are largely filled with bulky commodities. Of all these commodities much greater quantities are used in London itself than in any other centre of the country; but great quantities are also sent away by rail from London, and great quantities by sea both to British and foreign ports with which London carries on a regular trade. The daily shipping reports show how many ships come to the large ports laden with 'general cargoes,' that is, cargoes composed of many kinds of goods brought together to get the advantage of carriage in large ships.

169. It is obvious that the advantage of carrying in large ships will be the greater the longer the distance that goods are so carried. That is one way in which the relation of the place of origin to the destination of goods affects the route followed (**165**). It is one reason why the eastern goods mentioned come chiefly to London in the first instance, and also the reason why the great bulk of Australasian and Cape wool imported into England comes first to London, even though not a pound of it is worked up there, but all has to be sent away again either to Bradford or some other town at home or to foreign countries.

170. Then, again, the nature of the commodities may affect the route at sea by determining whether the goods are sent by sailing vessel or steamer, for which the routes in many cases differ. Perishable goods, like fresh meat, vegetables, fruit and flowers, butter and eggs, and goods of high value in proportion to their bulk, like mails, silks, watches, jewellery, ornamental feathers and artificial flowers, are taken by the quickest routes in spite of the increased cost per mile, and may often be transferred from sea to land, and then again from land to sea if necessary, for the sake of speed.

171. The goods for which **sailers** are likely to be preferred are generally those bulky goods which have already been instanced as likely to make up whole cargoes. But even bulky goods are being carried in larger and larger quantity by steamers, not only in consequence of the saving of time and the greater certainty with which their arrival can be counted on, but also because steamers can in many cases carry even bulky goods as cheaply, or nearly as cheaply, as sailers. This is partly because bulky goods, if heavy, are often valued as ballast, and partly because steamers are on the average larger than sailers. Sailers are, however, still much employed, and even very large sailers.[1] Hence it is important to note how their routes are more or less governed by the prevailing or constant winds. The large coasting schooners employed for bulky cargoes on the Atlantic coast of the United States are one of the cheapest of all means of transport. Large sailers are also used on long ocean voyages.

172. A careful study of the facts mentioned in paragraphs **52-54**

[1] The largest sailing vessel yet built, the *R. C. Rickmers*, a five-master capable of carrying about 8,000 tons dead weight, was launched at Geestemünde in 1906. It is, however, provided with auxiliary steam-engines for propulsion.

will throw light on the routes of sailing ships as indicated on the accompanying map. A vessel taking the outward route from the English Channel to New Zealand, it will be observed, keeps well to the east of the Azores so as not to have south-westerlies as head-winds and so as to get the benefit of the north-east trades as soon as possible. After crossing the belt of calms and variable winds the vessel makes for the coast of South America, at first at right angles to the south-east trades, and afterwards, from about 21° S., getting the benefit of the winds that circulate round the 'horse latitudes' of the South Atlantic—that is, the area of high pressure in about 30° S., round which the winds blow in a direction opposite to the movement of the hands of a watch. These winds, blowing, in the west of the area referred to, from about 20° to 30° or 35° S., parallel to the coast of South America, ultimately bring the vessel to the 'roaring forties,' which carry her steadily eastwards south of the Cape of Good Hope and Tasmania to New Zealand. On the homeward voyage the same winds carry the vessel south of Cape Horn, after which the vessel stands well out to sea and sails northward through the middle of the Atlantic more or less obliquely to both trade winds, and, keeping well to the west of the Azores, has a good chance of favourable winds up to the Straits of Dover in the region of the prevailing south-westerlies.

173. The differences between the summer and winter routes in the Indian Ocean as shown on the map are explained by the seasonal changes of the winds. The main thing to bear in mind in studying the routes of the northern winter is that during that season the north-east monsoon blows over the Arabian Sea and the Bay of Bengal. The remarkable route from Mombasa homewards during the northern summer is due to the fact that at that period of the year the trade-winds of the southern hemisphere are strengthened and drawn further to the south, so that a vessel then sailing southwards from Mombasa would encounter head-winds. The homeward route from that and adjacent ports during the northern winter is direct, northerly winds then prevailing off the African coast in those latitudes.

174. To San Francisco the outward route is at first the same as to New Zealand, but continues roughly parallel to the coast of South America all the way to Cape Horn, after which the vessel sails first northwards across the 'roaring forties' till the south-east trades begin to blow her north-westwards, and the same general direction is on the whole maintained until the vessel reaches a latitude at which it may take advantage of the westerly winds blowing on the north of the horse latitudes of the North Pacific to be carried inwards to San Francisco. In this (northern) hemisphere the circulation round the horse latitudes is in the same direction as the movement of the hands of a watch. On the homeward voyage the vessel in the southern hemisphere keeps well out to sea so as to pass to the west of the southern horse latitudes, the centre of which is in about 120° W.

175. The most striking route of all is that from San Francisco to Callao, which is to a large extent the same as that from San Francisco to Cape Horn, but passes round the horse latitudes, the vessel going with the wind first south (more than 20° south of its destination), then east, then north. The differences in the outward and homeward routes to the south of South America are explained by the remarkable persistence of a small cyclone just to the south of Tierra del Fuego, bringing about the prevalence of westerly winds about the latitude of Cape Horn, and easterly winds a couple of degrees further south.

176. Steamer routes are almost independent of winds and currents. Where practicable, the shortest route from port to port is adopted by steamers, and that is a route following an arc of a great circle of the earth, in other words, a circle of which the centre of the earth is the centre. Hence where the route is from north to south or the reverse a meridian is followed, but where the route is from east to west it is only on the equator that the route lies along a parallel of latitude. As these parallels become shorter and shorter towards the poles, the shortest or **great circle routes** deviate more and more from the parallels as the poles are approached. The further north an east to west route lies in the northern hemisphere the more will it curve towards the north from the parallel connecting places at the ends of the route, in the opposite hemisphere the more will it curve to the south as one nears the south pole. In the northern hemisphere if the route is to a port lying north-east of the starting-point, the great circle route will be represented on a map drawn on Mercator's projection [1] by a curved line lying to the north-west of the straight line connecting the starting-point with the destination; if the course is from north-west to south-east, the curve will lie to the north-east of the line joining the two ends. If the course is from south-west to north-east in the southern hemisphere the curve on the map will lie to the south-east, and if from north-west to south-east it will lie to the south-west of the respective straight lines joining the points of departure and arrival.

177. It is only on a globe that great circle routes can be at once seen and measured. This is done by means of a flexible strip of brass called a quadrant, marked in degrees of the earth's equator according to the scale of the globe for which it is constructed. Each degree represents 60 nautical miles,[2] the unit in which ocean distances are usually stated.

178. To take great circle courses, however, is not always practicable. The relations of sea and land may prevent it, and so also may the character of the climate. For example, the great circle route from

[1] Mercator's is the only projection on which all directions referred to points of the compass are shown by straight lines. That is why this projection is nearly always used for marine charts.

[2] One nautical mile = 1·1507 statute mile.

Longmans, Green & Co. London, New York, Bombay, Calcutta & Madras.

Cape Town to Wellington, New Zealand, goes to the south of the Antarctic Circle, and for that reason a more northerly though longer route is preferred.

179. Among frequented ocean routes those in which great circle sailing causes the most marked deviation from the parallels of latitude are those of the North Pacific, where very wide stretches of ocean have to be crossed between the ports of North America and those of eastern Asia. Yokohama is in a more southerly latitude than San Francisco, yet a steamer sailing for Yokohama from San Francisco begins by sailing north-westwards, and describes a curve which rises to about 48° N. The route from Vancouver or Puget Sound to Yokohama passes just south of the Aleutian Islands. In the narrower waters of the North Atlantic the rise of the east-west great circle routes to the north of the parallels is not so striking, especially since Newfoundland lies in the way on any great circle from the south of Ireland to any American port north of Cape Hatteras. The trend of the coast-line south of that cape is almost on the line of a great circle passing thence to the south of Ireland, and hence it happens that the routes from all American ports from Nova Scotia to the Gulf of Mexico are almost identical from about the meridian of 60° W. eastwards to the English Channel, and this is accordingly the busiest tract of the ocean. On the busy tracks of the Trans-atlantic traffic, Atlantic lanes, as they are called, are prescribed for the sake of safety for east and west bound vessels respectively, varying according to the period of the year.

180. In some cases the route is slightly modified by the position of **coaling stations.** Next to the North Atlantic route, the most frequented is that through the Suez Canal, which is the meeting-place of all European and North Atlantic lines to East Africa and the Far East, and most of those to Australia and New Zealand. The part from the Straits of Gibraltar to the mouth of the Gulf of Aden is common to most of the lines following these routes. On this section the chief coaling-stations are Gibraltar, Algiers, Port Said, and Aden. These coaling-stations are also great *entrepôts.* At Gibraltar and Port Said many goods are landed by vessels entering the Mediterranean from the west or east respectively for ports of the Mediterranean or the Black Sea, at which the vessels landing the goods do not call. Algiers is a convenient *entrepôt* on account of its intimate relations with Marseilles (about 410 nautical miles distant). Aden is a place at which goods for East Africa can be dropped by steamers belonging to eastern Asiatic and Australasian lines, and goods from East Africa can be picked up by steamers of the same lines. Colombo is the coaling-station and *entrepôt* where the lines diverge that pass round the south of Australia. Singapore is the chief coaling-station and *entrepôt*, and Batavia a minor but still important port for vessels going further east, and at one or other of these the lines diverge that go round the

north of Australia. The main route to the east continues on to Hong-Kong, Shanghai, Nagasaki, and Yokohama, all great coaling-stations and the first two great *entrepôts*, Hong-Kong for southern China, and Shanghai for the Yangtse valley and northern China. Important branch lines proceed from Singapore to the ports of Indo-China, to North Borneo and to Manila in the Philippine Islands.

181. In the North Atlantic Ocean St. Vincent in the Cape Verde Islands is an important coaling-station both on the route to Cape Town and that to all the South American ports south of Cape S. Roque. Norfolk, on the coast of Virginia, a place of shipment of the excellent steam-coal of the Pocahontas coalfield (1299), about 400 miles by rail distant, is a place frequently visited for coal by vessels returning from the Gulf of Mexico to the English Channel or the Irish Sea ; and since the opening of the Panama Canal the adjacent port of Newport News has become a great coaling place on that route. St. Thomas and St. Lucia in the West Indies are coaling-stations visited on routes from North to South America or from Europe to Central and the north of South America, and St. Michael in the Azores may serve the same purpose both for steamers plying between north-western Europe and the West Indies and between North America and the Mediterranean.

182. In the South Atlantic the chief coaling-stations are Cape Town and Buenos Aires, both of which obtain their steam-coal chiefly from Cardiff. On the American seaboard of the Pacific there is no great coaling-station between San Francisco, which gets its coal mainly from the coal-mines of Vancouver Island, and Conception Bay in Chile, where coal-mines exist close to the sea. Honolulu is a coaling station on the routes from western North America to Australia and New Zealand, and Durban is of growing importance on the Indian Ocean.

183. The tonnage of shipping required to carry on the ocean commerce of the world has no direct relation to the value of the traffic. 'Valuable,' as an epithet applied to goods, implies that the goods are of small bulk in comparison with their value. The quantity of shipping employed in ocean commerce is determined, therefore, chiefly by two things—the amount of traffic in bulky goods, such as those mentioned in paragraph **167**, and the amount of passenger traffic.

184. AERIAL TRANSPORT has been the most striking development of the early years of the twentieth century, having been greatly promoted by the invention of the petrol engine. This engine is now used both on **aeroplanes** or flying machines, whose buoyancy depends on the maintenance of the motion of artificial wings, and **air-ships** or dirigible balloons, whose buoyancy depends, like that of ordinary balloons, on the lightness of hydrogen gas. The former are comparatively light machines, capable as yet of carrying only the airman with an extra load not exceeding 13 tons. Air-ships on the contrary are of considerable size and may remain in the air for more than four days at a time.

Aeroplanes can ascend to 10,000 feet,[1] and have attained a speed of upwards of 180 miles an hour, but the speed diminishes greatly as the load is increased. The name of **water-plane** or **sea-plane** has been given to an aeroplane capable of rising from the water into the air as well as from land.

185. Both aeroplanes and airships have been made only too familiar by their use and abuse in the war. Whether there will be any important use for airships in peace has not yet (1921) been ascertained,[2] but there seems to be no doubt that a place in regular traffic for aeroplanes is assured. So far there is little likelihood of their being able to compete with railways on short journeys, but on stages of 400 miles and upwards, and even shorter stages involving a sea crossing, a future is open to them for mail and possibly also for passenger traffic. Aeroplanes are now constructed capable of non-stop flights of over 2,000 miles. In December 1918 one flew from Cairo to Delhi, a distance of upwards of 3,200 miles, in 47 hours 20 minutes, collecting and delivering mails on the way, and the establishment of regular international postal services is contemplated. For such services extensive plains present the advantage of offering easy landing-places almost anywhere, and for use in countries in which aerodromes or aeroplane stations have to be carefully selected it is important that aeroplanes can now be constructed in which the angle of downward glide can be determined so as when once fixed to be independent of human control.[3]

186. A serious element in the cost of transport is what comes under the head of **handling** or the transference of the goods from one means of transport to another, or to the place where they are deposited by the purchaser. So greatly has the cost of transport been cheapened that in some cases the final handling is dearer than the carriage of the goods for great distances. It has been stated that a ton of coal is carried the thousand miles from Buffalo to Duluth for about the cost of shovelling it from the side walk into the cellar. It is these handling charges, together with the cost of the delivery of goods to the customer or the collection of goods from the customer by cart or motor wagon,[4]

[1] On one occasion an ascent to upwards of 30,000 feet was made.

[2] A British built commercial airship, with a nominal lift of more than 60 tons, a speed of 50 miles an hour, and a range estimated at more than 4,000 miles, was completed in 1921, but destroyed by fire during flight the same year.

[3] Before the end of 1920 there were regular commercial air services between the chief centres of central and western Europe—from London to Paris, Brussels, and Amsterdam; from Paris and Berlin, radiating in various directions, from Bordeaux, on the one hand, to Nice, on the other hand, to Barcelona, Alicante, Malaga and Rabat in Morocco.

[4] For the transmission of goods by different lines of railway to different customers large establishments have each separately to sort the goods according to their destination, and similarly each railway has to sort the goods for the customers to whom they have to be re-delivered. To facilitate this work it was proposed to establish a vast clearing-house in Clerkenwell, London, where goods should be collected and sorted for dispatch and placed in the proper railway wagons. A committee of the House of Commons, however, reported adversely on the scheme.

that make up the terminal charges of British railway companies and which in certain cases form a very high proportion of the total freight rate. The importance of avoiding numerous handlings of commodities in the course of transport thus becomes obvious. Before the opening of the Panama Canal it was necessary for the goods to be loaded and unloaded six times between New York and the wharves at Guayaquil on the coast of Ecuador.

187. The general tendency of the modern developments of transport has been to reduce the number of such handlings and to introduce more economical methods. The fact that railways, on which the same wagon may be sent over thousands of miles on interconnected lines, reduce the necessity for handlings has already been implicitly referred to as one of the great advantages of this means of transport. Among modern methods of handling may be mentioned the use of large grabs or mechanical shovels capable of lifting ten tons at a time, the equipment of wharves and railway sidings with powerful cranes worked by electric motors, the use of endless bands for the horizontal transmission of commodities like grain from warehouses to ships, and of bands or chains provided with hooks or other holders for lifting. Large truck-loads of coal and other commodities can be emptied through shoots into the holds of vessels, and a case is recorded in which a vessel of nearly 10,000 tons was loaded with iron ore at Duluth in 25 minutes. On the Aire and Calder Canal trains of boats containing coal for export at Goole are made in sections of 35 tons, and each section is lifted separately and emptied at once of its contents. Arrangements have been made for the conveyance of coal from a wharf on the Thames to electricity works at Hammersmith, 600 yards distant, by means of hydraulic power, the coal being sucked with water through pipes into tanks where it is stored. It is one of the advantages of grain that it can be handled like water, so that it can be sucked up from the holds of vessels. Other illustrations of the modern simplifications in the handling of special commodities will be found under Wheat (**256-257**), Petroleum (**545**), and Sugar (**424**).

188. POSTS AND TELEGRAPHS. Cheap postage is another of the gains to commerce that have accrued since 1800. The **penny post** was introduced in the United Kingdom in 1840; the **general postal union** owed its foundation to a conference held at Bern in 1874. The practical use of the **electric telegraph** dates only from 1846 (more than twenty years later than the introduction of steam railways), but the apparatus necessary for their working is so much less costly than that of railways that the spread of the electric telegraph over the world has been even more rapid than the use of steam for locomotion. The first message through a submarine cable (between the South Foreland and the coast of France) was sent on November 13, 1851. In 1866 was laid the first permanently successful submarine cable across the Atlantic Ocean. Now many cables cross the North Atlantic, and since the com-

pletion of the cable from Vancouver by way of Fanning, Fiji, and Norfolk Islands to New Zealand and Australia in 1902, all the oceans have their opposite sides connected by this means. In recent years also renewed attention has been given to wireless telegraphy, which, on various systems, has been found of great use in communicating between different ships at sea, and between ships and the shore. Communication by wireless telegraphy on the Marconi system (that which is coming into most general use) was established between the Lizard, in Cornwall, and the Isle of Wight, a distance of 200 miles, in January 1901, and in 1907 regular communication by the same means was established between Clifden, County Galway, Ireland, and Glace Bay, Nova Scotia. On March 1, 1920, one between Carnarvon in Wales and Belmar, N.J., U.S.A., was begun. Now all large and most small vessels, airships and some aeroplanes are provided with wireless apparatus, and it is possible to construct wireless stations capable of communicating with all the great cities of the world.

189. The chief commercial advantages resulting from the introduction of the electric telegraph are these. First, without its aid in signalling it would be impossible to work the traffic on the busier railways; second, it allows of a great reduction in the amount of stock kept in store[1]; and third, it reduces the risk of loss through fluctuations in prices.

190. The **telephone** first became known in its present form at the Philadelphia Exhibition in 1876. Since 1914 rapid progress has been made with wireless-telephony, and by 1919 this was associated with direction-finding apparatus, making it possible for ships to ascertain their position at sea, by taking bearings on shore wireless stations. In the following year it was so far developed that songs could be heard quite distinctly more than two thousand miles away.

191. One effect of all the recent improvements in the means of transport and communication has been to enable places remote from the seat of production of any particular commodity to supply themselves with that commodity more directly than previously. Shipping lines have been multiplied to all inhabited coasts; railways thread their way in most parts of the world, wherever there is even a tolerably dense population; the wants of any district can be communicated at once to the ends of the earth; and the consequence is, that goods can be sent in the most direct way wherever they are needed in sufficient quantity to require special means of carriage. But it is obviously impossible that most articles of commerce can ever be sent from the place where they are produced to the places in which they are used or consumed without changing hands many times, and it is manifestly convenient that the exchange should take place, wherever possible, on a great scale.

[1] Before the war it was stated, for example, that only about a fortnight's supply of wheat was held at any one time in London.

192. COMMERCIAL AND INDUSTRIAL TOWNS. Hence it arises that there are certain places in which it is most convenient for the exchange on a great scale to take place. These are great business centres, commercial towns; and the situation of these towns in many cases shows that there are special conveniences for exchange that have favoured their rise and growth. All towns are more or less centres of exchange. Whatever else they may be, they are places where stores of goods in common request are kept, so that the inhabitants of the district round may be able to supply themselves with these when they wish. But in order that a town may grow up to be a great business centre it must have special advantages of one kind or another for the exchange of goods or a certain class of goods.

193. These advantages may be of very various kinds. The mere fact that a town lies about the middle of a densely peopled district is likely to make it in many cases the most convenient place of exchange for the products of that district and the articles brought from more distant parts to be used within it. Hither are brought in large quantity the various products from the parts in which they most abound, and hence they are sent out again in smaller quantities, along with quantities of other kinds of goods, to the parts in which they are required.

194. So, too, towns that are situated where the form of the surface in the country round about causes a number of roads to converge are likely to grow up into more or less important business centres. If a town is situated in a more or less open expanse enclosed by hilly country through which valleys have allowed roads to be made in different directions, it will naturally be the centre of business for the districts to which these roads lead, and its importance as such will probably be in proportion to the productiveness of the surrounding regions. Since from a level country roads will naturally converge towards passes which lead over hills or mountains, towns are apt to arise, in such situations, at the meeting of hill and plain. In like manner, many towns have grown up at spots where for any reason there was a convenient crossing-place on a river by ford or bridge, and many others exist at the confluence of navigable rivers where the nature of the ground is suitable for a site, for the traffic borne on the rivers is there divided.

195. Business towns likewise spring up in many situations in which the circumstances necessitate a change in the mode of carriage. Of this class of towns, seaports are the most numerous examples. Where goods have to be transferred from any mode of land carriage to ships, there must necessarily be a town to accommodate those engaged in this transfer. Hence it is that so many of the large towns of the world are seaports, the relative importance of which depends chiefly on the productiveness and accessibility of the regions served by them, or, in a single word, of their **hinderlands,** and the facilities which they afford to shipping.

ILLUSTRATIONS OF HINDERLANDS

Longmans, Green & Co., London, New York, Bombay, Calcutta & Madras.

196. The term hinderland[1] is one that may be used both with reference to a single seaport and to a seaboard on which there are several seaports, and may be defined as the land which lies behind a seaport or a seaboard, and supplies the bulk of the exports, and in which are distributed the bulk of the imports of that seaport or seaboard, either generally or in relation to certain seas. The necessity for the last clause in this definition arises from the way in which the outline of the land sometimes determines the port with which an inland region communicates in its relations with different parts of the world. Thus the West Riding of Yorkshire may be included in the hinderland of Liverpool for Irish and even a considerable amount of trans-Atlantic trade, but for North Sea trade it obviously belongs to the hinderland of Hull, Goole, or Grimsby. The Elbe basin forms the chief part of the hinderland of Hamburg in relation to all North Sea and oceanic traffic, but is included in that of Lübeck in relation to the Baltic. Toulouse belongs to the hinderland of Bordeaux for all traffic except that of the Mediterranean, for which it would naturally make use of Cette or even of Marseilles.

197. From some of the examples just given, it will be observed that the hinderlands of different ports may overlap even in relation to the same seas. This arises from the facts referred to at the end of paragraph **195**, the influence on a seaport of shipping facilities and facilities for communication with the hinderland. The hinderlands of Hull and Goole to a large extent coincide, but where the economy of transport effected by the use of large ships is the chief consideration, Hull will be preferred on account of the superior facilities for shipping there afforded, but where smaller vessels serve the requirements of a particular trade, Goole may and probably will have the preference in consequence of being nearer the hinderland. The trade of Quebec may encroach on the hinderland of Montreal, but its distance from that hinderland will prevent it from doing so except in the case of such traffic as is greatly promoted by rapidity of transit, such as passenger traffic, and traffic in the more perishable, or more valuable and less bulky commodities. Trade rivalries and the nature of the internal means of communication also affect the competition of ports in the same hinderland, as in the case of Grimsby and Hull. Lastly, it should be pointed out on this head that the extent and importance of a hinderland may be greatly increased by improvements in the means of internal communication; and for illustration of this remark it will be enough to refer to what is said in paragraph **1061** with regard to Bombay.

[1] This word, in its German form *hinterland*, was first introduced into English, so far as I am aware, about 1884, in connection with the discussions that arose on the occupation of parts of the West African coast. It came at once into general use from the fact of its meeting an obvious requirement, but it seems to me that, when so essential a word can be changed from German to English by the alteration of a single letter, it is to be regretted that the English, almost self-explanatory, form of the word is not universally adopted.

198. The frequent necessity for change in the mode of carriage also helps to explain why towns are apt to grow up at the foot of pass-roads, and the same circumstance likewise explains the precise situation of many towns situated on rivers. Many such towns are situated at the highest point to which rivers can be navigated, or can be ascended by vessels of a certain size ; many, where a rapid hinders, or a fall prevents further navigation. To one or other such points goods are conveyed by boats, and a town springs up where they are landed. Other towns on navigable rivers are situated where there is a sudden change in the direction of the stream, because at that point goods must be landed which are not intended to follow the new direction taken by the river. Even where the navigation of rivers has ceased to be important the study of navigable rivers must have a permanent place in economic geography on account of their having determined the original sites of towns, where subsequent growth is due to other causes, in a large measure to the provision of other means of communication. It has been said that the location of every city of importance in the eastern part of the United States, with the single exception of Indianapolis, was determined by the possibilities of water transport.[1]

199. Since the development of machinery, many large towns have sprung up where there is abundance of coal, or coal and iron, or extensive water power, the mainsprings of modern industry ; and all such towns are more or less business centres. Yet they are often far from being business centres in proportion to the extent of their production. Where numerous manufacturing towns exist on a great coalfield the business of exchange may be centred in one of them that is not pre-eminently itself a manufacturing town. The great magnitude of the business of exchange in such a region is adverse to the carrying on of manufactures in its business centre, for the cost of land, owing to the requirements of merchants and others for offices, &c., becomes so great that it is too expensive to erect large factories. Hence it is that Manchester, in which, according to the estimate of a local manufacturer, is sold probably three-fourths of the cotton-yarn spun, and even a larger proportion of the cotton cloth woven in the United Kingdom, is less of a manufacturing town than many of the smaller towns round about.

200. What has just been said makes it clear that a variety of influences must be kept in mind as affecting the **localisation of industry.** These work in combination, in some cases one or two of them having the chief efficacy, in others another group, and unfortunately neither individually nor in association is it possible to measure them. The main localising influences may be considered under the heads of the market, the labour supply, the cost of land, the situation of raw material, the nature and situation of the sources of power, the value of the commodities produced in relation to the cost of the various items entering into their production, and finally the supply of capital.

[1] Moulton, *Waterways versus Railways* (1912), p. 46.

201. In connection with influences coming under any of the heads enumerated, two general facts are worthy of note. First, the psychological action of the sense of opportunity as a stimulus to exertion can hardly be exaggerated. 'What is wanted,' says Bertrand Russell, 'in order to keep men full of vitality is opportunity, not only security.'[1] Emeritus Professor Marshall gives his sanction to the remark 'that a man's energies are at their best when he is emerging from poverty and distress into the command of great opportunities.'[2] 'An English labourer or artisan,' Sir Bampfylde Fuller points out,[3] 'is a different man after a few months' experience of the stimulating prospects of Canada.' It is the great function of capital to create opportunities, but economic development is likely to be most rapid where opportunities are most obvious and easiest to turn to account. The second general fact referred to is that great economies can always be effected where it is profitable to work on a large scale, though that does not imply that there are no economies peculiar to small scale production.

202. It is obvious that the profitableness of large scale operations must depend on the adequacy of **the market,** which again is governed by various conditions as (1) The number of people where the industry is carried on; (2) The purchasing power of the people, a great contrast in this respect being presented by China, India, and Africa as compared with Canada, the United States, and other new countries, in which latter the purchasing power is enhanced by the diffusion of education, and probably still more by the extent of the undeveloped resources; (3) The nature of the commodity for which a market is sought—cheap goods for peoples of small purchasing power, more valuable commodities for regions in which individual wealth is greater; (4) Facilities for transport as enlarging the range of the market (**197**). Here it may be noted that the aim of a protective or preferential tariff is to preserve a large market for the favoured industry or industries. Where the protection afforded is absolute, the whole country embraced by the tariff forms a local market for the protected industry.

203. As to **labour,** see more particularly pars. **105** and **114-115,** but we may note further that much depends on the opportunity for organising labour, and that while abundant labour necessarily involves the presence of a more or less important market, the degree of its importance must vary in proportion to the purchasing power of the labourers. The cost of land is another fact intimately related to the value of the market as influenced by populousness and purchasing power. As pointed out by Sir William Petty, a dense population is a great advantage in all matters involving mutual aid.[4] This advantage is usually paid for when a high price is given for land. The considera-

[1] *Principles of Social Reconstruction,* p. 135.
[2] *Industry and Trade,* p. 87.
[3] *Life and Human Nature,* p. 209.
[4] *Political Arithmetick* in Hull's edition of Sir W. Petty's writings, vol. i., p. 255.

tion as to the value of commodities is intimately connected with that as to labour organisation. Industries concerned with the manufacture of very valuable products of highly skilled labour, such as calculating machines, typewriters, electrical apparatus, &c., may be carried on with advantage in any of a thousand places in a fairly populous region furnishing a large part of the demand, but in such a region the spots affording the greatest facility for distribution will naturally be selected. The supply of capital is another item more or less related to the number of the population but far from being directly proportioned to its density. On the sources of power see, besides the paragraphs just mentioned, those dealing with petroleum and other oil-fuels (**545**, &c.), industrial alcohol (**613**), and falling water, together with electricity as an agent in the distribution and application of power (**116**). Of all the sources of power, however, coal is still by far the most important, and hence special stress has to be laid on it as a localising factor, and in connection with that there fall to be noticed certain considerations applying to raw materials generally.

204. The influence of coal in promoting the growth of towns is both direct and indirect. If the mines are large and numerous in one locality, the population of miners with their dependants and the shop keepers required to supply their wants will form a considerable town, but this population is generally increased more or less by the industries to which the presence of the coal gives rise. It is evident, however, from a consideration of the facts of industrial distribution in different parts of the world that the influence of coal in attracting industries to the coal-fields varies in different circumstances. The great coal-fields of England and Scotland, of Germany, Belgium, and the north of France have all become seats of varied industry, but in the United States, the greatest coal producing country in the world, most of the manufacturing towns lie hundreds of miles away from the coal-mines, even where the power which they use is now mainly derived from coal, and some of the leading textile manufacturing towns both of Germany and France are also at a great distance from the mines.

205. To understand the very powerful influence that coal has in attracting manufacturers to the place of its production, one must bear in mind one broad fact to which attention has been called,[1] that raw materials tend to attach industries to their place of production in inverse proportion to the amount of the raw material that enters into the final product. A raw material which enters wholly into the manufactured product without leaving any waste can in itself, that is, apart from other favouring circumstances, have no effect in planting an industry where the raw material is found or produced. This is true, however, not only of original raw material but also of such half-manufactured raw materials as are not more bulky and expensive to transport than the materials from which they

[1] Alfred Weber, *Ueber den Standart der Industrien*, Tübingen, 1909, pp. 60–62.

are made. It is true, for example, of pig iron and steel blooms and billets, which can be so freely sent great distances both by land and sea to feed the higher branches of the iron industry carried on where other conditions may be more favourable. Conversely the presence of a raw material of which a large proportion is waste has a tendency to attract the industry making use of it to the material, or at least those stages of the industry which are necessary to get rid of the great bulk of the waste. Hence it is that a large variety of timber products are made by local sawmills in the neighbourhood of the forests from which the timber is obtained, that pulp-wood is locally made into wood-pulp and even paper, tanning and dyeing extracts made locally from wood and bark, sugar generally locally manufactured at least to the stage of 'raw' sugar, coco-nut kernels dried into copra, cacao beans extracted and dried, metallic ores partially refined on the spot into mattes, and so on. Now when coal is used as fuel, and that is its principal use, no part of the coal enters into the finished product, so that, if it has to be transported, the cost of carriage is an extra which would be wholly saved if the industry for which it is dispatched could be carried on with advantage where the coal is produced, an extra which is all the more serious on account of the great bulk of coal in proportion to its value. True, the tendency of coal to localise industries from this cause may be counteracted by other localising influences, such as those indicated in par. **200,** two or more of which may act in conjunction. As a striking illustration of the way in which some of the advantages just mentioned may combine to localise an industry away from the coal even where coal is used in large amount, one may take brick-making as carried on on a very large scale at Peterborough, England. The raw materials are brick-earth, water, and coal. Neither the water nor the coal enters into the final product, but the brick-earth does so wholly, yet the industry is carried on where the brick-earth not the coal is found. But brick-fields cover a great extent of ground, and it would probably be difficult to find land as cheap on the coal-fields as that where the brick-earth lies, and, what is more important, to carry the brick-earth to any coal-field would be carrying it farther away from the great market for the bricks, namely London. Still the varied industries and rapidly increasing populousness of most coal-fields in advanced countries sufficiently illustrate the easily understood influence of coal in promoting the growth of towns.

206. In par. **513** a statement is given of the relative estimated proportion of coal used for different purposes in the United Kingdom, pre-war Germany, and the United States. The large proportion consumed in the iron and other metal industries is striking. The heaviest consumption is in the blast furnace and in the making of mild steel and ingot iron, and it is hence natural that these industries should be specially attracted to the coal-fields. It is these industries that form the chief exception to the general rule in the United States that the

manufacturing towns are not on the coal-fields. Yet, even in the smelting of iron, it sometimes happens that the transport is in the other direction, the ore being carried to the coal. In some cases so little of the ore enters into the raw iron that there is less waste of haulage in bringing the coal to the ore, especially if the limestone, another material required in smelting (**529**), no part of which enters into the product, is more conveniently accessible from the coal deposits. In other cases the advantage of using the means of transport in both directions, instead of having in one direction empty railway wagons or ships in ballast, leads to a reciprocal trade with a smelting industry at both ends. Sometimes again all three raw materials are collected at some convenient point in relation to the transport of the materials, the labour supply, and the means of distribution of the product, as at Middlesbrough in England, and Buffalo, Sault Ste. Mary, South Chicago, Gary, and Duluth on the great lakes of America.

207. Among finished articles using steel without waste of the raw material, rails and structural steel in particular may be mentioned as manufactured very extensively where the steel is produced, but this is because these are industries that benefit largely by large scale organisation as well as through the economy arising from using the steel before it has lost the heat given to it in the process of manufacture. Still the increase in bulk in structural steel adds so much to its cost of transport, that it is sometimes found advantageous to carry on this industry in or near a very large market, such as London, in spite of the local lack both of coal and iron. The bulkier the final product and the more skilled labour counts for in its production, the less powerful is coal as a factor in determining the seat of an industry, and in such cases the tendency is for the industry to be carried on in the vicinity of the principal market or markets. It is for these reasons that the manufacture of agricultural implements is largely carried on in agricultural districts, as in the east of England and the north-west of America. The large areas required for the plant in these industries are another reason for their deserting the more crowded industrial centres. In the textile industries, if other conditions are equal, the advantages of local coal (or water-power) may be decisive, but there are abundant examples to show that these industries also are easily deflected from the source of power.

208. Where the advantage of local coal is the main cause or one of the main causes of establishing industries employing a good deal of labour, other industries to which cheap coal is not of such vital importance may be set up in the same places on account of the labour supply thus afforded. The contiguity of various industries favours all of them in so far as it facilitates the shifting of the workers from industry to industry, or at least from one branch of an industry to another, according to the vicissitudes of trade.

209. Central stations for the development by coal or gas made from

coal, of power to be transmitted by electricity have become very numerous in recent years, but have not so far done much for the dispersal of industries. The stations have been established principally for the sake of the economies to be made in applying the power, which is distributed for the most part within a comparatively small radius. Indeed, what specially favours the establishment of large central stations is precisely the existence of a large densely peopled industrial district.

210. All the circumstances mentioned in par. **202** are manifestly subject to change, and so to contribute to fluctuations in industry and commerce. Markets may become more valuable through increase in population or the development of resources previously unused, by improvement in the means of transport and in other ways. The supply of labour, both skilled and unskilled, may be changed by migration, that of skilled labour locally increased by education and experience. Capital, where scanty and dear in proportion to the undeveloped resources, may be cheapened by local accumulation, by increase in security, or by increasing knowledge in the investing countries of the security actually afforded. In the case of primary raw produce an important distinction must be made between those products which are completely or economically exhaustible, such as minerals and natural fertilisers worked like minerals, and those which can be reproduced indefinitely; and among these again the distinction must be kept in mind between those which can be reproduced annually or even several times in a season (such as clover, alfalfa, &c.), and those which can be reproduced only at intervals of years, sometimes prolonged intervals, like timber and pulp-wood trees.

211. As already indicated (**198**), the prosperity and relative importance of towns at the present day are in many instances due to other circumstances than those which determined their original situation and favoured their early growth. The very fact that a town exists and has attained a moderate size makes it a more or less convenient centre of exchange, and hence may make it worth while to increase its facilities for this purpose. Growing up, in the first place, it may be, at a point to which roads naturally converged, it became of sufficient importance to have new roads made from it. So in modern times railways have been made to towns because the towns already existed; and now the prosperity of the town is determined by the railways. In many cases the introduction of railways has favoured some towns at the expense of others, which may before their introduction have had a more favourable site. But the importance of such natural advantages as have been pointed out above is still to be seen in situations where towns grow up in new countries.

212. The great business centres of the present day in populous countries fully provided with the modern means of transport are places in which the staple commodities can be procured at any time, in any quantity in which they are likely to be wanted; but it was different

in former times, and is still different in less populous and less commercially developed countries. In the latter countries it is still the custom, as it once was more generally, to hold periodical fairs at certain places at stated times. At these fairs merchants congregate from a greater or less area round in proportion to the importance of the transactions carried on, and the local dealers, in a single journey to the great market, supply themselves with all they are likely to want till the next fair. The places chosen for fairs are naturally, in many cases, such as present peculiar facilities for communication in several directions. In eastern countries, great fairs are often at the same time great religious festivals, as at Mecca in Arabia, Allahābād and Hardwār in India, and the place of the fair is determined chiefly on religious grounds.

213. The **pilgrimages to Mecca**, which form so important a feature of the Mohammedan religion, may here be specially noticed. All Mohammedans, poor or rich, are enjoined by their religion to proceed at least once in their lives to the sacred city of Mecca. The poor live by the way on alms, but most of those who are better off take with them all their possessions, thinking them well spent in accomplishing this object of devotion, or, if they are rich enough to have goods to spare at the end of their journey, hoping to increase their wealth by trade, which the more fortunate of them all the more easily do, since thousands of pilgrims are compelled to part with all that they have left for whatever they can get. In certain cases these pilgrimages have been of use in introducing the products of one region into another. The Arabian coffee-plant, for example, is said to have been introduced into southern India by a pilgrim on his return home.

214. COMMERCIAL COUNTRIES. The facilities for exchange that have given to certain towns a high degree of importance as business centres have during certain periods secured a peculiarly commanding position in the commerce of the world for different countries. One of the chief advantages for holding such a position lies in occupying a central situation between the regions with which the great commerce of the world is carried on. In the middle ages the most valuable commerce was that between eastern Asia and Europe; and as long as this was carried on through western Asia or by the Red Sea, **Italy** had peculiar advantages for securing the bulk of that commerce. The ships of Genoa and Venice visited all the coasts of the Mediterranean, the Black Sea, and western Europe, and the commerce with the heart of Europe was carried on by way of the Alpine passes. It is owing to the former pre-eminence of the Italian cities in this trade that so many places in the east of the Mediterranean have Italian names or names of an Italian form. The name Levant for the east of the Mediterranean is itself a name of Italian origin; the names Negroponte, Montenegro, and others are Italian; and Aleppo is an Italian form of the local name of that town.

215. Before the close of the fifteenth century some of the land routes for commerce with the east had already been closed through political events (**1006**), but the discovery of the sea-way to India round the Cape of Good Hope (**157**) gave the most serious blow to the eastern trade of the Italian cities (**982**). In 1504, a contemporary chronicler records, the galleys of Alexandria returned in February to Venice empty—a thing that had never been seen before, and in March those from Beirut were found to be empty likewise. The chronicle is continued till 1512, and speaks constantly of the scarcity of spices in Venice. In 1506 it is specially noted that at a fair in that year the Germans had bought very little. As early as 1504 a project for cutting a sea-canal through the Isthmus of Suez, with the view of regaining for Venice its lost supremacy, began to be urged; but this project, it is needless to say, was never carried out under Venetian auspices. The trade with Germany still continued, indeed, during the whole of the century, and also the following century; but it was in a state of decline. At first eastern commodities were to be purchased at Lisbon, but soon the towns of **Flanders** and **Holland** (Antwerp and Rotterdam —**814**) secured the bulk of the commerce with central Europe. But as commerce has grown more world-wide, as the New World has become more populous and more wealthy, the advantage of situation has come to belong to the **British Isles,** which are nearly in the middle of the land-surface of the globe. This is far, however, from being the sole advantage which Great Britain possesses as a mercantile country, and hence the nature of this and other advantages will be more particularly considered elsewhere.

216. LANGUAGE, &c. The language of commerce, when carried on between peoples speaking different tongues, is generally of a very mongrel character. In the days when Italian trade was predominant in the Levant, there arose in all the coasts of that region a trade language, the basis of which was a corrupt Italian, but which borrowed numerous words from the local dialects in different places. This language is known as the **lingua franca,** and is still spoken in many Mediterranean towns, above all in Smyrna. The dominant languages of commerce at the present day have all begotten corrupt forms of speech of a similar nature. In Chinese ports a mongrel kind of English is spoken, which is known as **'pijin' English** (*pijin* being the Chinese pronunciation or corruption of *business*). A **'negro English'** is spoken in many places on the west coast of Africa, another kind of mongrel English in New Guinea. **Arabic** is spoken with many corruptions, and much admixture of words derived from other languages throughout the Mohammedan world. **Kiswahili,** the language of the mixed Arabic and Bantu race in tropical East Africa known as the Swahili, is the common medium of intercourse throughout that region, and even among many Congo tribes, and the **Hausa** language 'acts as a sort of *lingua franca* over practically all Africa north of the equator and west

of the Nile valley' (Robinson, *Hausaland*, p. 170). **Chinese,** in some form or other, is the prevailing language of trade, not only in China itself, but on all the coasts of Indo-China, and the **Malay** language predominates in the Eastern or Malay Archipelago. **Spanish** is the prevailing language of the New World south of the United States, except in Guiana and Brazil. The wide predominance of Spanish commerce in former days is still seen in the survival of a few Spanish words in more than one *lingua franca*, of which English or some other language forms the basis.

217. At the great fairs frequented by merchants from many regions in which different languages are spoken, no mongrel speech, however well established, suffices for commercial intercourse, and there the business of **interpreter** (often combined with that of broker) is an important one. Andrée mentions that he knew of an interpreter of Nizhniy-Novgorod who, besides German, could speak all the Romance languages, and, moreover, Russian and Polish, Tatar and Persian, Arabic and Armenian, Hindustani and modern Greek.

218. Where there is neither a common language nor an interpreter available, traders are necessarily reduced to the use of **signs**; but this mode of doing business is sometimes resorted to for another reason, namely, to enable business to be transacted in open markets without the knowledge or interference of bystanders. On the Red Sea coast a code of signs with the fingers for trade has come into very general use, the signs consisting in touching different parts of the hand and fingers, and being made under a cloth which conceals from parties not engaged in the transaction the nature of the signs made.

219. INSTRUMENTS OF EXCHANGE. Another indispensable means of carrying on trade on a great scale is the existence of some common measure of value. Such a common measure, when it is used for no other purpose, or when chiefly used for that purpose, is **money.** In intercourse with uncivilised peoples it is still necessary in a great many cases to resort to **barter**—that is, to the exchange of articles that are intended for other purposes than media of exchange.[1] Thus, on the west coast of Africa, palm-oil, rubber, and other products are bought with cotton-stuffs, rum, and muskets; on the Senegal gum is bought with printed calico; in the interior of Africa Dr. Junker found that he could buy a sheep or a goat with a yard of white cotton; in many parts of Africa coloured beads, which are worn as ornaments, are a very common means of purchase. In the interior of Borneo the price of a picul (133⅓ lbs.) of gutta-percha is 'an old Tower musket, a piece of white cotton shirting, and a small quantity of salt.' In the old trapping days of the Hudson's Bay Company, at the time when beaver-skins were of great value in Europe, a trade gun would buy

[1] The post-war situation has led to some remarkable forms of barter, as, for example, Bavarian peasants undertaking the maintenance of town children for a given period in exchange for stated quantities of maize, oil-cake, or phosphates.

from the Indians as many beaver-skins as could be piled up on each side of it. Even in a civilised country like Persia, we are informed that 'in the Resht trade money seldom passes; the goods are bartered against Russian or English piece-goods.' (For. Off. Papers, Ann. Ser. No. 113.)

220. One of the less obvious inconveniences of this mode of carrying on trade is the fact that the articles used as a means of purchase are in many cases accepted only over a very limited area. The equipment required for an expedition into one part of the interior of Africa may be different from that required on an adjoining route. On the one the natives will take, it may be, chiefly cotton goods; on another, only beads and copper wire. The coloured cloths and beads that find favour in one division of the Mozambique coast of Africa are not to the taste of the inhabitants of another part, and for one district in this region a peculiar kind of native hoe has to be manufactured.

221. But even where trade is carried on by barter the need for some common measure of value soon comes to be felt, and hence some article of exchange in very general use is adopted as a standard with which the other articles of barter are compared. Thus, in western Africa a piece of cotton-cloth of about six yards in length has come to be very generally recognised as a unit of value, and as one yard forms a smaller unit, a piece of cloth of that size is usually made up into six folds.

222. The articles that have been and are used as **money** in different parts of the world are very various. Of all non-metallic kinds of money, that which has come into most extensive use is the cowrie-shell (*Cypræa moneta*), which is very largely used in the trade of Africa and southern Asia, as well as in the islands of the Pacific. The home of this shell is the Pacific and Indian Oceans, and shiploads of it are conveyed from the Maldive Islands, the Philippines, and other island groups, to the European ports which carry on trade with the African tribes among which this kind of money circulates. In New Guinea a small kind of cowrie is threaded in hundreds on slips of cane, and these slips serve as money. On the island of Yap, in the western Carolines, the money takes the highly inconvenient form of huge discs of aragonite, a form of carbonate of lime, quarried, it is said, two hundred miles away, in the Pelew Islands. In ancient Mexico the currency of the country consisted of 'bits of tin stamped with a character like a T; bags of cacao, the value of which was regulated by their size; and, lastly, quills filled with gold-dust.'[1] Even on the Atlantic coast of the United States at the present day,[2] oysters are stated to be used as money in a certain district on Chesapeake Bay, an oyster forming the regular subscription of a daily newspaper.

223. Of all forms of money the most convenient, and those in

[1] Prescott, *Conquest of Mexico*, vol. ii., ch. ii.
[2] So at least it was stated in 1888.

most general use, are **gold and silver or other metallic coins**, and the coining of metals is in all civilised countries one of the prerogatives of the government. Coins are seldom made of any one metal. For convenience of manufacture various alloys are used, but all coins on their issue from the mint ought to possess a definite weight of the principal metal in their composition, whether gold, silver, or copper. The proportion of that metal to the total weight of the coin is called the **fineness** of the coin.

224. The value of a coin does not always depend solely on the amount of fine metal which the coin contains. Coined money is of two sorts, which are called respectively **standard money**[1] and **token money.** The former is that in which the fine metal used is the standard metal of the country—that is, the metal which ultimately fixes the value of all the coins used in the country. In order that any particular metal should form a perfect standard, the conditions that must be fulfilled are these. The metal in question must be received for coinage in unlimited quantities by the state, and coins made with that metal must be made unlimited legal tender; that is to say, payment in such coins must be declared to be a valid discharge of any debt, however large. If gold, therefore, is the standard metal of any country, any gold company can take as much gold as it raises to the mint of that country, and receive in exchange the same quantity of gold in the form of coin, with a small reduction, it may be, for the expense of coining. In these circumstances, it is obvious that the value of the gold is represented exactly by the value of the equivalent coin, and the value of the coin will rise and fall with the value of the gold.

225. It is otherwise, however, with **token money.** The value of the fine metal in such money is fixed by law in relation to the value of the standard metal. The non-standard metal is not received in unlimited quantity for coinage at the mint; and when the money made with it is merely a token money, it is not made legal tender except in payment of small sums. Thus in the United Kingdom, in which gold is the standard, silver coins are not legal tender above the value of 40*s.*, and copper coins not above 1*s.* In some countries both gold and silver coins are made legal tender in unlimited quantities, but this law is to a large extent nullified by the limitation of the silver coinage issued by the mint. Where silver or copper coins are mere token money, they represent in coins a greater value, and sometimes a much greater value, than that of the fine metal contained in them. At the average price of silver in 1886 the English mint could buy for 3*s.* 9*d.* enough silver to make silver coins to the value of 5*s.* 6*d.*

226. Such **variations in the value of silver compared with that of gold** make it necessary to take the value of silver into account in comparing the value of the commerce of a country having a silver standard with that of another having a gold standard, when the values are

[1] For the time being the war has destroyed standard money everywhere.

expressed in the standard of money of the respective countries. In the Appendix a table showing the average value of silver in London per ounce is given for each year from 1873 downwards, along with the fine weights of the standard coins of all the countries that are of much importance commercially, the gold- and silver-standard countries being distinguished from one another. When the variations in the price of silver are great they are the chief cause of the fluctuations in the rate of exchange between gold- and silver-standard countries—that is, the fluctuations in the amount of the coinage of the one country that is taken as equivalent to a certain amount of the other.

227. Though in gold-standard countries it is customary and natural to speak of fluctuations in the price of silver, it must not be supposed that gold does not vary in value. Where it is the standard of a country, it is true that its value, expressed in the coinage of that country, cannot vary. But it is obvious that a change in the value of silver in relation to gold (such as we have just been speaking of) is a change in the value of gold in relation to silver; and in silver-standard countries it is as natural to speak of changes in the price of gold as in gold-standard countries it is to speak of changes in the price of silver.

228. Moreover, everybody is familiar with the fact of variations in the price of commodities. Now in gold-standard countries there are not only variations in the value of these commodities in relation to gold, but also in that of gold in relation to them. Where there has been a greater or smaller change in one direction (whether a rise or fall) of all or nearly all commodities, it will be right to say absolutely that, whatever the cause may have been, there has been a change in the value of gold. When distant dates are compared (intervals of a generation, or one, two, or three centuries, for example) it is nearly always found that such a change in value has occurred. This is not the place to elucidate the nature and cause of such changes, but it is important to bear in mind that, whereas statistics of commerce in which values are expressed in the same standard coin afford a more or less satisfactory means of comparing different countries at the same period, they are far from being so satisfactory as a means of comparing the commerce of the same country at widely different dates. The sum of £5,000,000 in 1800 is a very different thing from the same sum in 1900.

229. We must here refer also to the fact that money in the form of coin is used only to a very limited extent in the discharge of pecuniary obligations, whether the parties belong to the same country or to different countries. The equivalent of coin in paper is the more usual mode of payment in the case of all but small transactions, and the proportion of debts discharged in this way is generally greater in proportion to the commercial development of the country in which the transactions occur.

230. Whatever the form of a **paper circulation** may be, its efficiency

as a perfect substitute for coins depends on the fact of the holder of the paper being able to obtain the equivalent in coin whenever he wishes it. In payments made within the bounds of any particular country, the most usual substitutes for coin are **bank-notes** and **cheques.** Bank-notes are promises of a bank to pay; cheques, orders to a bank to pay, made by persons who have money at their credit in the banks on which the orders are made. In large transactions, payment is very often made in the form of a **bill of exchange**, which is a demand upon a merchant to pay at a certain date a certain sum of money for goods which he has received. Such a demand is usually presented to the merchant to whom it is drawn for his acceptance, which he signifies by his signature, and when accepted by him it becomes a valid claim against him. The details in connection with the use of bills of exchange are far too numerous to be mentioned here; but it is necessary to state that it is usually in connection with such bills that the **rate of exchange** between different countries is spoken of. Bills of exchange are very generally made use of in settling debts between persons belonging to different countries, because they are a cheaper method of doing so than using coins for the purpose. If coin, or bullion, whether gold or silver, were sent, the cost of its carriage would have to be paid for; it would have to be insured, and other expenses would have to be incurred. It is obviously, therefore, a cheaper method for a merchant who has a claim against him in another country to send over an equivalent claim which somebody else may have on some one in that country. He buys that claim in the form of a bill of exchange, and the price which he has to pay for it varies according to circumstances. It varies according to the credit of the person or persons who accept responsibility for the bill, according to the date at which it becomes due (being obviously of less value if payable three months after date than if payable at sight); and even with the 'best' bills—that is, those secured in the most satisfactory way by the credit of the responsible parties—it varies according to the state of trade between different countries. When the bills procurable in one country, A, against another country, B, are greater in value than those in B against A (which is equivalent to saying, when A has exported to B a greater value than B to A), A will have more bills than are necessary to meet the claims of B. Those holding such bills in A will, accordingly, be unable to get as good a price for bills as those in B who hold bills on A. They will be glad to sell them at as good a price as they can get, for they run the risk of being unable to find a customer for them, and hence being obliged to bear the expense of having coin sent over to them in discharge of their claims. Holders of bills against A in B, on the other hand, will find that there is a great demand for their bills on the part of persons who fear lest they may have to bear the expense of sending coin over in discharge of their debts, and will therefore ask as high a price as they find they can exact.

231. Readers must be referred elsewhere for fuller information on these matters, but enough has been said to make **three facts of importance** manifest: **first**, that the rate of exchange for the equivalents of the same coins may be different in one country from what it is in the other (which, in fact, it usually is); **second**, that there may be differences in the rate of exchange between countries having the same standard coin (as England and Australia); and **third**, that in normal circumstances the extreme limit of fluctuation in the rate of exchange for bills payable at sight, above or below the exact equivalent of the coinage of the one country in the coinage of the other, must be the cost of transmitting the coin itself. For it is obvious that no one would pay for a bill wherewith to discharge a certain claim in money more than it would cost him to send the necessary coin or bullion.

232. The rate of exchange between different countries is further complicated when the currency of a country is in the form of **inconvertible paper money**—that is, where the government of the country issues notes professing to be of the value written upon them, and makes them legal tender for any amount in transactions between the inhabitants of that country, but refuses to give coin in exchange for them on demand. In such cases the paper money always circulates at a greater or less rate below the value of the coin which it professes to represent.

Tables of the more important standard coins and moneys of account and of the principal units of the metric system of weights and measures are given in the Appendix.

COMMODITIES

I. Commodities dependent Directly or Indirectly on Climate

A. Products of the Temperate Zone

233. WHEAT. This, the most valuable of all the grains of temperate climates, has been cultivated from the remotest antiquity. The remains discovered at the lake-dwellings of Switzerland belonging to the Neolithic period, or New Stone Age, show that at that time, long before the beginning of written history, as many as five different varieties of wheat were already in cultivation. The crop early acquired an important place as an object of agriculture in all parts of the temperate zone in the Old World where the climate was favourable to it, and gradually extended its domain at the expense of other crops which in certain regions were more easily grown, but which yielded a less valuable grain. Though **in the New World** wheat, like most other grain crops, was **unknown in the time of Columbus,** its cultivation has since spread there to such an extent that Europe now makes up by supplies obtained thence the greater part of her own deficiency in this cereal. In Australasia also this grain is now in general cultivation, and in fact there is no part of the world with a suitable climate and a sufficient population where wheat is still unknown.

234. A crop so valuable, so widespread, and so long in cultivation could not fail to exhibit a great number of **varieties** and to show the result of past care in improved quality. The varieties of wheat cultivated at the present day yield larger grains than those of the ancient lake-dwellings. The number of the varieties now grown is probably in a literal sense countless, new varieties constantly being produced. Very often these varieties, as in the case of other cultivated plants, manifest strong local preferences, and do not flourish except in particular regions. The seeds of English wheat fail in India ; and, on the other hand, the wheat-growing region of northern India, in which the crop has to ripen during the cool season (**1047, 1053**) before the advent of the scorching heats of summer, has developed varieties of wheat which ripen in a shorter period than those of colder climates, but which pine and dwindle when an attempt is made to grow them in England. It is still more important that varieties have been developed which ripen in the short summers of the Canadian north-west

and Siberia. Not only does the behaviour of the crop under cultivation thus vary in different regions, but there is also a difference in the composition of the grain derived from crops grown in different parts of the world.

235. The **best soil** for the cultivation of wheat is one in which clay predominates, but which is not too stiff and heavy. As regards **climate,** wheat demands a higher temperature than any of the ordinary cereals of the temperate zone, except maize, so that its northern limit lies to the south of those of oats, rye, and barley. Further details of interest regarding the soil and climate best adapted for wheat are given in the following paragraphs, extracted from the report in the Tenth Census of the United States.

236. 'As regards soils, we may say in a general way that light clays and heavy loams are the best for wheat. On the one hand, very heavy clays often produce good crops, both as to yield and as to quality; and, on the other hand, the lighter soils may yield a good quality—it is simply smaller in quantity. The best crops, however, come from moderately stiff soils, but any fertile soil will produce good wheat if all the other conditions are favourable. . . .

'Good wheat-lands agree in this: that they are sufficiently rolling for natural drainage, are at the same time level enough to admit of the use of field machinery, and are easily tilled, admitting the use of light field implements in their tillage, and thus allowing of a very large production of grain in proportion to the amount of human labour employed. . . .

237. 'For commercial as well as agricultural success, climate is an all-controlling condition. Wheat is normally a winter annual. For a good crop the seed must germinate and the young plant grow during the cool and moist part of the year, which season determines the ultimate density of growth on the ground, and consequently mostly determines the yield. It ripens in the warmer and drier parts of the year, which season more largely determines the quality, plumpness, and colour of the grain. In climates with winters so cold that all vegetable growth is suspended, we have two distinct classes of varieties, known respectively as spring and winter wheats. . . . In California, and in similar climates, as in Egypt, this distinction does not exist in respect to their cultivation, although the varieties partake more of the character of winter wheats than of spring, both in their mode of growth and in the character of the flour made from them.

238. 'But in all climates, and whatever variety may be grown, the crop must be sown and have its early growth in a cool part of the year. Wheat branches ["tillers"] only at the ground, and produces no more heads than stalks, and it only sends out these branches early in its growth or during cool weather, and when the growth is comparatively slow. . . . A cool, prolonged, and rather wet spring is therefore best for the ultimate yield of the crop . . . a warm, rather

dry, rapidly growing, and early spring . . . diminishes the yield ; there are then fewer stalks, and the heads are fewer. . . .

239. ' In a country of cold winters, for good crops it is better that the ground be continuously covered with snow. Bare ground, freezing and thawing, now exposed to cold and dry winds, and now to warm sunshine, is exceedingly destructive to wheat. It " winter-kills " in two ways : it may be frozen to death by cold, dry winds, or, as is more often the case, particularly in soils rich in vegetable matter, it " heaves out," and by the alternate freezing and thawing of the surface soil the roots are lifted out of the soil and the young plant perishes. . . .

240. ' The ideal climate for wheat is one with a long and rather wet winter, with but little or no frost, prolonged into a cool and rather wet spring, which gradually fades into a warmer summer, the weather growing gradually drier as it grows warmer.

241. ' The quality of the grain is largely determined by the climate, a hot, dry, and sunny harvest-time being best for wheat of the first grade. . . . The wheat of sunny climates—those of California, Egypt, Northern Africa, and similar countries—has always ranked high for quality. . . . The particularly bright character of American grain depends upon the climate rather than upon the soil. The sunny climate of the whole United States south and west of New England is favourable for this, and from the time of the first settlement of the colonies the bright colour of American grain as compared with that of Northern Europe, particularly that of Great Britain, has been remarked.'[1]

242. The following table, based on Dr. Unstead's *Statistical Study of Wheat Cultivation and Trade,*[2] gives for the average of the years 1901–10 some typical illustrations of the **differences in the average yield of wheat** in bushels per acre in different parts of the world :—

Countries	Bushels	Countries	Bushels	Countries	Bushels.
Belgium	35	Austria	19	Japan	17
Denmark	(?) 35	Hungary	18	United States	(?) 14
United Kingdom	32	Roumania	17	Manitoba	17
Germany	29	Bulgaria	15	Argentina	11
France	20	Russia (Eur.)	10	Victoria	10
Italy	13	India	(?) 11	New Zealand	31

The countries that stand highest in the list are mostly such as have a dense population and a system of agriculture that has been undergoing continuous improvement for generations—countries, accordingly, in which manure is cheap relatively to the value of the land, or those with rich soil only recently brought under cultivation. Three cases

[1] Tenth Census of United States : Statistics of Agriculture, Cereals, pp. 63, 64.

[2] *Geog. Jour.*, vol. xlii. (Aug. and Sept., 1913). As to the uncertainty attaching to the estimates for Denmark and India, see p. 258, and that as to the United States, pp. 260–62 of that paper.

of an exceptionally low produce per acre are worthy of special notice as illustrating the effects of different causes. In **Victoria** and Australia generally the low out-turn is to be ascribed mainly to the climate, which has but a scanty rainfall (**1376**), and is hence unfavourable to the tillering of the wheat and the filling of the ear, but, it may be added, is warm and sunny, which is highly favourable to the quality of the grain. In South Australia, which till recently was the chief wheat-growing part of Australia, the yield is even worse than in Victoria—only about 5 bushels to the acre, the rainfall being there scantier and more uncertain. In **Russia** the low average of the out-turn is in great part due to the backward state of cultivation, for the soil on which much of the Russian wheat is grown is one of the best in the world (**910**). A large part of the wheat-growing area of Russia may, however, like those of Victoria and South Australia, be described as lying on the margin of adequate rainfall, so that the yield of the crop varies greatly with the amount of the rainfall, and the same is true of such productive areas as Manitoba and the adjoining parts of the United States. In one of the governments of southern Russia (Voronezh), the aggregate yield of all cereals has been known to vary in the course of ten years in the ratio of 6 to 1. In the years 1890–99 the yield of wheat in Victoria [1] varied from a minimum of 4 to a maximum of 11·1, in South Australia from a minimum of 1·7 to a maximum of 7·9 bushels per acre. In Manitoba the average yield in 1900 was less than 9, in 1901 more than 25 bushels per acre. These may be compared with the returns for Tasmania and New Zealand, in which the rainfall is more ample, and in which the extreme yields in 1890–99 were about 15 and 27 and 18 and 33 bushels respectively. In Argentina several causes combine to bring about a low average yield. In some years droughts destroy the crops (especially in the west of the wheat-growing area), in other years floods, in others frosts (especially in the south), but more than all these, locusts (especially in the north). Hence here also there are great variations in the calculated yield. In 1896–97 it was estimated at about 5 bushels per acre, as against 16½ in 1893–94.

243. The superiority of wheat as a food-grain for man depends chiefly upon the quality of the bread made from the flour, which is generally regarded as more palatable than any kind of bread made from other grains, even though these may be little, if at all, inferior to wheat in nutritive properties; but this superiority is so generally recognised that it is difficult for us to realise the fact that wheaten bread was a rarity even in some parts of England within the last hundred years. It is still a rarity, at least for the poorer classes, over a large part of the European mainland, though it is now coming more and more into use even among the poor. This result is solely due to the rapid extension of commerce since the introduction of steam-

[1] In 1903 the Victorian yield was only about 1·3 bushels per acre.

power. Europe, while constantly increasing its consumption of wheat relatively to population, has been growing less and less able to supply its own wants in this article, and thus becoming more and more dependent on supplies from elsewhere. The consequence is, that the international commerce in wheat and wheat flour has not only come to exceed that in all other grains, but has grown to a magnitude rivalled only by that in a few other articles, such as cotton and wool, the two great clothing materials of the world. The great wheat-importing countries are those of the west of Europe, in which manufacturing industry is so highly advanced that there is a relatively large population dependent on supplies from abroad; and the United Kingdom stands at the head of the list, taking the largest share of the wheat export from all the great wheat-exporting countries, so that an account of the British wheat trade will serve to give a general view of the wheat supply of the whole world.

244. Early in the eighteenth century England could not only supply all her own wants in wheat, but in good years could even spare more than a quarter of a million bushels for export, and it was only towards the close of the century, after the great development of the cotton manufacture had begun, that the importation of grain became a regular necessity. The amount of the import continued on the whole to increase, notwithstanding the existence of import duties, which were generally fixed on a scale which imposed a very high duty when the price of wheat sank to a point which was then considered very low. In those days the chief supplies for the United Kingdom were derived from France and other countries belonging to the continent of Europe. From February 1, 1849, a uniform import duty of one shilling per quarter was established, and on June 1, 1869, even this was abolished, both wheat and flour being admitted into this country from that date duty free.[1] Meanwhile the dependence of the British Isles upon foreign wheat has been steadily increasing, and their sources of supply have become more widespread. It has been estimated that shortly after the middle of the nineteenth century the United Kingdom produced on an average between 70 and 80 per cent. of all the wheat consumed in the country, whereas on the average of recent years the proportion of home-grown wheat to the total consumed has sunk to somewhat less than 30 per cent.

245. The following table presents some of the most important facts relating to the British import trade in wheat in periods of five years. The British export trade in wheat is small, but there is a large export of British milled flour.[2]

[1] A duty of 3*d.* per cwt. on wheat, 5*d.* on flour, was levied in 1902–3.

[2] In 1913 the British export of wheat and wheat-flour was about 2·7 per cent. of the total import, more than two-thirds of this being made up of British milled flour, no doubt mainly from imported wheat. It is worthy of note that in more than one recent pre-war year, upwards of 2,000 tons of British grown wheat has been exported to France, and there is a regular export of this commodity to other countries.

Total British Import of Wheat, whether as Grain or Flour, in Equivalent Weight of Grain.

From 1871 to 1900, countries from which the wheat was shipped, afterwards the countries of origin.	Percentage of total import.						Consigned.	
	1871–5	1876–80	1881–5	1886–90	1891–5	1896–1900	1906–10	1911–13
Atlantic Ports . .	*29·4*	*41·8*	*35·4*	*32·5*	*41·6*	*49·7*	—	—
Pacific Ports . .	*10·4*	*11·5*	*18·1*	*15·6*	*10·5*	*9·9*	—	—
Total U. States . .	39·8	53·3	53·5	48·1	52·1	59·6	26·8	29·4
Argentine Republic .	—	—	—	1·5	8·0	8·4	19·1	16·2
Canada . . .	7·4	6·0	3·5	3·4	5·1	7·8	15·1	24·8
Russia . . .	23·4	12·6	11·7	18·5	14·3	9·6	14·0	10·7
India . . .	1·4	4·8	12·3	11·8	9·5	4·3	11·7	21·4
Australasia . .	2·2	3·7	5·2	2·4	3·0	1·7	8·5	21·4
Austria-Hungary .	0·9	2·2	2·6	3·0	1·5	1·5	0·4	12·3
Germany . . .	9·2	7·8	5·5	4·1	1·0	1·3	0·6	0·1
Others . . .	15·7	9·6	5·7	7·2	5·5	5·7	3·8	0·7
	Annual Average in Millions of Cwts.							
Total . . .	50·49	63·31	76·78	77·79	96·58	95·37	113·94	119·4

246. These vast imports have led, first, to a lowering of the price of wheat, the mean of the yearly averages of the price of the imperial quarter of wheat having sunk from 54*s.* 6*d.* in 1871–75 to 47*s.* 6*d.* in 1876–80, to 40*s.* 1*d.* in 1881–85, and to 31*s.* 9*d.* on the average of the two years 1886 and 1887. A further decline followed to a minimum of 22*s.* 10*d.* in 1894. This has led to a steady contraction in the area devoted to wheat, which in 1860 occupied about 4,000,000 acres in the United Kingdom, but on the average of the five years 1881–85, about 2,830,000 acres. A further decline followed. A minimum, 1,456,000 acres, occurred in 1895.

247. If we now look at the **sources of supply** as shown in the table, we must first notice that it is not till the period 1906–10 that we get the true countries of origin, but a comparison with the so-called ‘import’ tables shows that of the countries mentioned there is a serious misrepresentation only in the case of the United States, Canada, and Russia.[1] In the latter part of the nineteenth century the striking feature is the largely increased proportion of a much larger total derived from America.[2] In the last lustrum of the century, the United States, Canada, and Argentina furnished more than three-fourths of the total

[1] In 1906–10 the quantity derived from the United States was overstated in the ‘imports’ table, and that from Canada understated, by a little over one million cwts.; that from Roumania was overstated and from Russia understated by a little over half a million cwts.

[2] The period 1901–5 was striking in several respects. There was once more a great advance in the total import, which amounted on the average to 111·64 million cwts. per annum. The ratio from the three American countries mentioned in the table fell, however, from an aggregate of nearly 76 per cent. to less than 63 per cent., this relative decline being compensated by a great advance in the import from India, Russia, and Australasia. In the case of the United States the decline was absolute—from an average of about 57 to one of about 42 million cwts.

supply. In Argentina, which first appeared in the British import tables as a source of wheat in 1883, the expansion has been due to the opening up of a new region of virgin soil as described in pars. **1360** and **1361.** In the United States and Canada, where the conditions of wheat production are very similar, we see in the period referred to a more striking illustration than ever before of the triumph of modern methods of production, handling, and transport. The subsequent decline in the proportion obtained from the United States is due to the fact that the demand for wheat in that country is increasing more rapidly than the supply.

248. In both these countries, the chief circumstance favouring the cheap production of wheat and other grain crops is the vast extent of arable land relatively to the number of inhabitants, and the consequent **cheapness of the land.** One result of this cheapness of the land is that the average size of farms in the United States is considerable (in 1890, 137 acres [1]), and that a large proportion of the farms belong to those who cultivate them.

249. In **India,** on the other hand, the chief circumstance favouring the cheap production of wheat is the **cheapness of labour.** The climate in those parts of India in which wheat cultivation is chiefly pursued and most rapidly extending, the North-West Provinces and the Punjab, is on the whole as favourable to the growth of wheat as in the United States, though in some parts irrigation is necessary in consequence of insufficient rainfall. Land, however, is dear [2]; and though it is true that many of the wheat-growers own the land which they till, and some of them do not even pay land-tax to the Government (**1052**), yet the effect of the dearness of the land is shown in the small size of the average farm throughout India, which is only about one twenty-seventh of the average size in the United States.

250. But the table brings out another point of importance. Down to the period 1881–85 the wheat import from the United States came in a greater and greater proportion from the Pacific ports—that is, principally from California, Oregon, and Washington (**83**), where rich wheat-fields are close to the seaboard. Since then the Atlantic ports of the United States and Canada have supplied the larger proportion, a result of the multiplication of railways in the interior of N. America east of the Rocky Mountains.

251. In all these regions the conditions are peculiarly favourable to wheat-growing. In some parts 30 bushels of wheat to the acre is said to be a common yield without manure, and there are said to be well-authenticated cases of even 70 bushels to the acre. So great are these advantages that they fully make up for the disadvantage of the

[1] Of which an average 79 acres consisted of improved land ; in 1900, 146 acres, of which 74 improved ; in 1910, 138 acres, of which 75 improved.

[2] In 1903 the best rice land in Tinnevelli (southernmost district, Madras) was selling at £133 per acre (Willis, *Agriculture in the Tropics*, p. 46). But this was land of exceptional productiveness.

long distance from the European market. In some cases wheat grown at a distance of 500 miles from the port of shipment has traversed before reaching its destination a route of more than 15,000 miles—that is to say, a length equal to about five-eighths of the circumference of the globe at the equator.

252. With respect to American methods of cultivating and handling grain, the following extracts from the article on Agriculture in the first supplementary volume of the tenth edition of the *Encyclopædia Britannica* will be found of interest:—

'The best illustrations of the great or "bonanza" wheat farms, as they are called, are found along the Red River of the North, where it flows between the States of North Dakota and Minnesota. . . . During the season of 1899 the product of hard spring wheat amounted to nearly 250,000,000 bushels, or two-fifths of the entire wheat product of the United States. Of this, Minnesota and the two Dakotas alone produced 200,000,000 bushels. . . .

253. 'Let us assume the conditions prevailing upon a bonanza farm of 5,000 acres, and briefly describe the process of wheat production from the ploughing of the land to the delivery of the grain in the final market. These great wheat farms were established upon new lands sold directly to capitalists by the railroads. . . . The improvements made upon them consist of the cheap wooden dwellings for the managers, dormitories and dining-halls for the men, stables for the horses, and sheds and workshops for repairing machinery. Very little of the land is under fence. . . . After burning the old straw of the previous year . . . comes the ploughing. . . . The plough used has a 16-inch share, turns two furrows, and is drawn by five horses. Each plough covers about 250 acres in a season, travelling an average of 20 miles a day. The ploughing begins in October, and continues a month or six weeks, according to the season. . . . Experience shows that it costs about 70 cents an acre to plough the land in this way. About forty men are employed upon a farm of 5,000 acres during the ploughing-season. . . . At the end of the ploughing season these particular men are usually discharged. Only eight or ten are kept on a farm of this size throughout the year. The other men go back to their homes or to the factories in the cities, where they await the harvesting and threshing season. . . . When March comes the snows begin to melt away, and by April the ploughed land is dry enough for the harrow. The harrowing is done with 25-foot harrows, drawn by four horses, and operated by a single man. One man can harrow 60 to 75 acres a day. The seeding follows immediately with four-horse press drills that cover 12 feet. The harrows and drills are worked in "gangs" as the ploughs were. Each drill will go from 20 to 25 miles a day. When the weather is good the seeding upon a 5,000-acre farm will be done in 20 or 25 days. . . . The men who do the most important work are all

temporary labourers. They come from the cities of the east or the farms of the south. They begin with the early harvest in Oklahoma, and work northwards up the Missouri and the Red River until the season closes in Manitoba. They are not tramps, but steady, industrious men, with few bad habits and few ambitions. On well-managed farms drinking and gambling are strictly forbidden. The work is hard, and, as there are few amusements of the farm, the men spend their resting periods in sleep. . . . The largest part of [their] food is brought from the eastern States. Some potatoes, turnips, and beans are grown upon the farms, but the corned beef, bacon, and groceries come from the cities. It is estimated that it costs 35 cents a day to feed each labourer. . . .

254. 'The wheat farmers say that it does not pay to take undue care of old machinery, that more money is lost in repairing and tinkering an old machine than would pay for a new one. The result is that new machinery is bought in very large quantities, used until it is worn out or cannot be repaired without considerable work, and then left in the fields to rust. . . . The harvesters vary in size according to the character of the land. Upon the rougher ground and small farms the ordinary binders are used ; upon the greater plains, like those of California, a great harvester is used, which has a cutting line 52 feet wide. These machines cut, thresh, and stack the grain at the rate of 1,600 sacks a day, and cover an area in that time of 100 acres. These machines can only be used where the wheat ripens thoroughly standing in the field. . . .

255. 'Every bonanza farmer's office is connected by wire with the markets at Minneapolis, Chicago, and Buffalo. Quotations arrive hourly in the selling season, and the superintendent keeps in close touch with his agents in the wheat-pits of these and other cities. When the instrument tells him of a good price, his agent is instructed to sell immediately. The farmer on the upper waters of the Red River of the North is kept fully informed as to the drought in India, the hot winds in the Argentine, and the floods of the Danube. . . .

256. 'The great elevator centres are in Duluth, Minneapolis, and Buffalo. These elevators [1] have a storage capacity of from 100,000 to 2,500,000 bushels. The new ones are built of steel, operated by steam or electricity, protected from fire by pneumatic water-pipes, and have complete machinery for drying and scouring the wheat whenever it is necessary. The elevators are provided with long spouts containing movable buckets, which can be lowered into the hold of a grain-laden vessel. The wheat is shovelled into the pathway of the huge steam shovels, which draw it up to the ends of these spouts, where the buckets seize it and carry it upwards into the elevator, and distribute it among the various bins according to grade. A cargo of 200,000

[1] Now being introduced into all parts of the world where wheat is largely grown for distant markets.

bushels can thus be unloaded in two hours, while spouts on the other side of the elevator reload into cars, five to ten at a time, filling a car in from five to ten minutes, or the largest canal-boat in an hour. The entire work of unloading, storing, and reloading adds only one cent. to the price of a bushel of wheat.' To this account two additions may be made. First, petrol driven motors are rapidly replacing horses for the traction of powerful agricultural implements; second, besides the great elevators there are multitudes of smaller ones. Every well-situated farm is within reach of more than one belonging to different owners, so that in selling his grain the cultivator can play off one against the other.

257. 'The transportation of the wheat from the fields of the North-West to the seaport is a business of tremendous magnitude. Most of this wheat goes by way of the lakes through the Sault de Sainte Marie Canal to Buffalo, where it is shipped by rail or inland canal to New York, Philadelphia, or Baltimore. Duluth, on Lake Superior, is, surprising to say, the second port in the United States in point of tonnage.[1] . . . The bushel of wheat, or an equivalent amount of flour, can be shipped from Minneapolis or Duluth to almost any point in western Europe for from 20 to 25 cents.'

258. It is the produce of these fertile regions, together with that of Argentina, which seems to have had the principal effect in lowering the price of wheat and driving that grain out of cultivation in the United Kingdom in the latter part of the nineteenth century. Now it is to be noted that, fertile as these regions are, they are bound sooner or later to meet the same fate as land similarly treated elsewhere in America has already undergone, namely, to become gradually less productive unless more expense is incurred in maintaining their fertility.

259. From the United States and British North America an increasing proportion of the wheat import is in the form of flour (**1309**), and it is in that form that we receive the bulk of the wheat imported from Hungary. The **Hungarian** millers are, in fact, noted for the unsurpassed, if not unequalled, quality of their **flour,** due to the excellence of their wheat, the perfection of their machinery, and the elaborateness of their methods, but partly also, it would seem, to the dryness of the climate; for it has been found that, even from Hungarian wheat, flour of equal quality cannot be made in the moist climate of Great Britain by the same methods and machinery.

260. Besides the countries mentioned in the preceding table, wheat is imported into the United Kingdom from Roumania, the Balkan Peninsula, Chile, and many other parts of the world.

Being thus supplied with wheat from all parts of the world, both in the northern and southern hemispheres, the British Isles receive

[1] But see par. **1316**.

these supplies more or less all the year round,[1] the date of the arrival being dependent not only on the time necessary for transport, but also on the date of the harvest, which varies greatly in so many latitudes and climates. The following table, the particulars of which, except in the case of North America, are mainly derived from Scherzer, shows that there is not a month in the year in which a wheat harvest does not take place in some part of the world :—

Date of the Wheat Harvest in Various Countries.

January . .	Australia, New Zealand, Argentine Republic, Chile.
February .	India.
March . .	India, Upper Egypt.
April . .	Mexico, Cuba, Lower Egypt, Syria, Persia, Asia Minor.
May . .	Morocco, Algeria, and Tunis ; the northern parts of Asia Minor, China, Japan, Texas, Florida.
June . .	The Mediterranean peninsulas and the south of France ; California, Oregon, Utah, and the greater part of central and eastern United States territory south of 40° ; Afghanistan, Japan.
July . .	France, Austria-Hungary, southern Russia, the northern parts of the United States of America, Ontario, and Quebec.
August . .	England, Belgium, the Netherlands and Germany ; the eastern parts of the Dominion of Canada.
September .	Scotland, Sweden, Norway, Russia.
October . .	Finland, northern Russia.
November .	Peru, South Africa.
December .	Burma, South Australia.

261. With regard to the total trade in wheat of other **European countries** than the United Kingdom, it is worthy of note that there were **only five**—Russia, Roumania, Austria-Hungary, Bulgaria, and Serbia—which, according to pre-war statistics, **exhibit an excess of exports over imports** in this commodity ; and among these, Russia's share amounted to about three-fourths of the whole. Not long ago France and Spain also exported in good years a considerable excess of wheat and wheat-flour, but both these countries are now to be reckoned among the countries that import more wheat than they export. A large part of the French import of wheat, like that of other Mediterranean countries, is now derived from India, the hard wheats of that country finding the readiest market in that region, since these yield the flour best adapted for the making of the tubular pastes known as maccaroni and vermicelli, which are favourite forms of wheaten food in Italy and other Mediterranean countries.

262. Taken as a whole, Europe still produces much more wheat than any other continent, so far as can be ascertained from statistical data. According to the figures compiled by the late Mr. Neumann Spallart, the average production of all European countries, except

[1] In 1901, for example, there were only two weeks (one in April and one in August) in which the import of wheat into the United Kingdom exceeded 2,000,000, and only five in which it fell below 1,000,000 cwts.

Turkey, for the years 1883–84 was about 1,276 million bushels (60 per cent.), against about 835 million bushels (40 per cent.) for the aggregate production of the United States and British North America, India, Australasia, Egypt, Algiers, Chile, and Japan.[1]

263. MAIZE is the only grain-crop which was introduced into the Old World from the New, and it owes the name of Indian corn, by which it is frequently known in England, to the fact that it was the only cereal of importance cultivated by the American Indians before the discovery of that continent by Europeans. Being a very productive crop—for it yields, under equally favourable conditions, fully twice as much grain to the acre as wheat—its cultivation spread very rapidly in the tropical and some of the warm temperate parts of the Old World when it became known there, but apparently much more rapidly in Africa, and even in the east of Asia, than in Europe; the reason of this, no doubt, being that the countries which were at that time most advanced in agriculture and industry were those in which the climate is least suitable for its cultivation.

264. Among other countries from which the cultivation of maize is excluded by the character of the climate is England, where the summer is not sufficiently long, warm, and sunny. The ideal **climate** for this grain is 'one with a summer 4½ to 7 months long, without frost, the middle portion hot both day and night, sunny skies, sufficient rains to supply the demands of a rapidly growing and luxuriant crop, falling at such intervals as to best provide sufficient moisture without ever making the soil actually wet.'[2] It is thus essentially a summer crop, and one that requires summer rains (or irrigation), though not very heavy and frequent rains. It is therefore unsuited to those countries which, like California, Chile, and most of those round the Mediterranean (**66, 897**), though admirably adapted for the growth of wheat, are characterised by summers of remarkable dryness. It was this circumstance that seems chiefly to have caused the slow progress of its cultivation in Europe (except Portugal), although it was gradually found to be very well adapted to the central parts of that continent, including northern Italy, and above all to the eastern parts (Roumania, with the adjacent parts of Russia), where the greater part of the rainfall of the year occurs in summer, and where the summers are at the same time remarkably sunny. The same characteristics render the climate of the greater part of the United States eminently suited to this crop, which is, in fact, the principal corn-crop of the country; so that when a native of the United States speaks of 'corn' simply, it is always maize that he means, just as an Englishman means by the same word wheat. In the Commonwealth of Australia

[1] According to the admittedly incomplete estimates of the International Institute of Agriculture, the world's wheat-crop in 1912–13 was equal to 3,631 million bushels (of 60 lbs.), of which 1,888 millions (52 per cent.) were produced in Europe.
[2] Tenth Census of United States: Statistics of Agriculture, Cereals, p. 92.

maize is the most important grain-crop in Queensland, and in New South Wales it ranks next after wheat.

265. The quantity and value of the maize imported into the United Kingdom (chiefly for the feeding of horses and cattle) are next to those of wheat among grain crops.[1]

266. In the British Isles maize is used as human food only to a very limited extent, and chiefly in the form of the so-called 'corn-flour'; but in many of the countries in which it forms a staple crop it is used in this way much more largely and in various forms. In the United States the heads of green (unripe) maize form a favourite vegetable, the grains being eaten like peas in this country along with meat, and a preparation known as hominy—a kind of pudding made from coarsely ground maize meal—is much liked. In Mexico maize is still, as it always has been, the principal food of the people, being coarsely ground at home and made into a kind of cakes called tortillas, which are eaten warm. The polenta, which forms a chief part of the food of the inhabitants of Italy, except in the extreme south, is generally made from maize-meal; and so too is the mamaliga of the Roumanians. In Transcaucasia the heads of maize are cooked under the name of kukurus. Various kinds of beer and spirits are also made from maize, which is now used to some extent even by English beer-brewers.

267. OATS. This crop can be cultivated with advantage over a wider range in latitude and on a greater variety of soils than wheat; but the climate best suited to it is one that is moister and has cooler summers than that best adapted for the latter crop. Such climates produce grain of better quality for all the purposes for which oats are grown, and, moreover, produce a much greater weight of grain per bushel, the variations in this respect being much greater than in the case of wheat. Whereas wheat does not often weigh much more or much less than 60 lbs. per bushel, oats grown in one place may weigh 50 lbs., in another place only 26 lbs. per bushel. This circumstance is all the more important since there are also great variations in the amount of meal yielded by oats, only the best qualities yielding as much as half their weight. Oats are consequently grown chiefly in the more northerly and moister parts of Europe; but still, being more easily grown than wheat, the quantity of oats produced exceeds that of wheat in most European countries, except those on the Mediterranean, the summers of which are wholly unsuited to this crop. This crop is by far the most important in Scotland, Ireland, Denmark, and Scandinavia.

[1] Down to the end of last century more than half the import was usually derived from the United States, which was followed by Roumania, but since then Argentina has come to the front, and now in most years furnishes more than half the import, while the share of the United States has come to be comparatively small. Roumania still retains the second or third place, about equalling the United States in its quota, and Russia sends a considerable supply. In recent years there has been a considerable import from South Africa.

Taking the United Kingdom as a whole, we find that oats form the only corn-crop which occupied on the average about as great an area in 1905–1910 as it did in 1871–75. This is chiefly due to the fact that an extension of its cultivation in England, in consequence of the extreme depression in wheat, compensated a great decrease in the extent of this crop in Ireland. Among British possessions, oats form the chief cereal crop in New Zealand, and it is the rival of wheat in Canada.[1]

268. In those countries in which this grain is chiefly grown, it generally forms a large part of the food of the people. In Scotland it constituted, in the shape of oatmeal porridge, oat-cakes, and other forms, the chief food of the people as late as the end of the eighteenth century ; but it is mainly as provender for horses that oats are grown, this grain being proved by experience to be the best for that purpose. In ancient times the grain was not much grown—no doubt in consequence of its unsuitableness for the climate of the countries round the Mediterranean, where the civilised nations of antiquity had their seats. It is not mentioned in the Bible, but it was cultivated in a small way in Italy, as food for horses, as early as the beginning of the Christian era. In central Europe, nevertheless, it was a grain of much greater antiquity, for it is found among the remains of the lake-dwellings of Switzerland, but not, according to Prof. Heer, among remains of as great age as some of those which include grains of wheat.[2]

269. BARLEY. This is in several respects a highly remarkable crop. By some writers it is believed to be the most ancient of cultivated grains. Several varieties of it (including two of that kind which is known in England as bere or bigg, having six instead of two rows of grain in the ear) have been found among the remains of the lake-dwellings of Switzerland. **Its range in climate is wider than that of any other cereal,** cultivation having led to the development of some coarse varieties which ripen their grain within a shorter period than the hardiest varieties of oats. Hence, of all cereals it is that which reaches farthest north in latitude, and highest up on mountain slopes. In Norway it is cultivated even in 70° N. On the other hand, it flourishes well in any soil and under any climate that is suited for wheat, and it is in such climates that the best barley is grown. Thus it happens that it is the associate of oats in the northern countries of Europe, which are on the whole too cold for wheat, and the associate of wheat in the southern countries of Europe and the other countries round the Mediterranean, which are too dry in summer for maize, but

[1] Since 1910 the acreage of wheat in Canada has exceeded that of oats, but the quantity of oats in bushels greatly exceeds that of wheat, though the difference in weight is slight, inasmuch as the average weight of a bushel of Canadian oats is only about 35 lbs.

[2] The total quantity of oats imported into the United Kingdom is on the average a good deal less than a fifth of the total quantity of wheat and flour. Formerly Russia was regularly the leading source of supply, but in some years the Russian share is now exceeded by that of Argentina, while Germany, Canada, and Roumania all send considerable quantities.

where the barley, like the wheat, is of excellent quality. In the United States the state that grows the largest proportion of barley is California, which, like the Mediterranean countries, has a climate unsuited both for maize (except on irrigated land) and for oats.

270. Barley appears to have been the chief bread-plant of the ancient Hebrews, Greeks, and Romans, no doubt because it was the most productive of the grains suited to the Mediterranean climate, for the quantity of grain which it produces to the acre is much greater than that of wheat (in England about one-fourth greater). Barley-bread was once common in Scotland, where it is still used to some extent, and it is likewise pretty largely eaten in Scandinavia; but nowadays barley is principally grown for the sake of the beer made from malt, that is, from barley-grain which has been allowed to sprout and then been killed. It is for this purpose that it is so largely grown in England; and for the same reason it is a very important crop in Germany (where the quantity produced annually is on an average almost equal to that of wheat), and in the state of New York in the United States. In Scotland and Ireland it is chiefly used in the making of whisky.[1]

271. RYE. This is the least familiar of all the grain-crops grown in the British Isles, but there is probably no other cereal except wheat that is cultivated so largely on the mainland of Europe as a bread-plant. Its great recommendation is that of all the bread-plants it flourishes on the poorest soil and in the most inhospitable climates, where, indeed, it thrives best. It is hence a great boon to the vast tract stretching from Holland, through northern Germany, into central Russia, which is mainly covered by a poor, sandy soil. Throughout that region, as well as in Switzerland, Denmark, and southern Scandinavia, it is the prevailing bread-plant. In Russia and in Switzerland it is more abundantly produced than any other grain. In the United Kingdom where grown at all it is so chiefly as a fodder crop, for which purpose it is useful in the south of England in the period between the exhaustion of the supplies of root crops and the maturing of clover and lucerne. In the United States the use of the grain in the making of bread is diminishing, the straw, which is largely used for packing and making certain kinds of paper and pasteboard, being there regarded in many places as the most valuable part of the crop. Formerly, however, it was otherwise (**1282**). Rye is imported into Great Britain only in very small quantity, and almost entirely from the continent of Europe.

272. BUCKWHEAT. This is a grain-crop unknown to the agriculture of the United Kingdom, but ranking next in extent of cultivation after those already mentioned, both in Europe generally

[1] The quantity of barley imported into the United Kingdom is somewhat in excess of the import of oats. Russia has long taken the first place among the countries furnishing this import, but important supplies are also obtained from Turkey (including Asia Minor, which is noted for the quality of its barley), Roumania, Algeria, Tunis, the United States, and sometimes India.

and in the United States and British North America. It does not belong, like most of the grain-crops, including all those already mentioned, to the great family of the grasses, but is an ally of some of our common weeds, such as snake-weed and persicaria, and a more distant ally of the common dock or sorrel. It is a native of eastern Asia, and was introduced into Europe only at a late period. Its French name, *sarrasin*, appears to indicate that in that country it first became known through the Saracens or Arabs. The grain is said to be very nutritious, and the crop has these recommendations, that it can be grown with hardly any cultivation on the poorest soils, especially, like rye, on very light, sandy soils, and that its sowing-time is late (in the United States from May to the middle of August), which often allows of its being sown to replace another crop that has failed. But against these advantages there are to be placed the great disadvantages that its yield is very uncertain, and that the very ease with which it can be grown encourages slovenly habits of cultivation. The only countries in Europe in which there is a considerable extent of ground under this crop are Russia and France. These two countries supply the bulk of the small British import.

273. PULSES. This is a general term rather vaguely used for certain pod-fruits—that is, fruits (in the botanical sense of that word) having large seeds enclosed in a long seed-vessel, the most familiar examples being peas and beans. The vegetable forms which have this kind of fruit are extremely numerous, and comprise lofty trees as well as tender plants ; but the term pulse is confined to such as supply seeds or pods capable of being used for food by men or cattle. For the most part, the pulses of commerce are derived from green plants often weak-stemmed, but we may include under this head the fruit of two trees, the carob, or locust, and the mezquite.

274. The chief pulses of commerce are common peas and beans, chick-peas, and soya-beans. **Peas** are those suited to the coldest climate, and are largely cultivated everywhere in the less warm parts of the temperate zone, though not confined to these parts. They are largely imported into Great Britain, chiefly from British North America and the United States, the former region, which is the more northerly, supplying by much the greater share. Many varieties of the **common bean** (*Phaseolus vulgaris*, Linn.) are cultivated, some suited to one climate, some to another; some grown solely as food for horses and cattle, others eaten by man. The largest imports of beans into this country are from the warmer parts of the temperate zone, especially from Egypt and other Mediterranean countries. The average acreage under beans and peas in the United Kingdom in the period 1881–85 showed in each case a decline of more than 100,000 acres as compared with the period 1871–75, and since then there has been a further decline in both. **Chick-peas** (*Cicer arietinum*, Linn.) are an important product and article of trade in southern Europe and northern Africa, and also

in India, where the crop is known as gram. In Spain they are one of the chief articles of diet of the people, and from Spain they are exported in large quantity to Cuba and elsewhere. From India they are exported to Mauritius and Ceylon as well as to the United Kingdom. In warm countries, where butcher-meat is little consumed, this and other pulses are in fact an almost essential part of the regular diet, since they supply elements of food not contained in sufficient quantity in grain and fruits. It is for this reason that **soya-beans** are largely consumed in two other warm countries, China and Japan, as well as in India. According to Decandolle this bean is indigenous in Cochin-China, Java, and Japan. It is now very extensively cultivated throughout eastern Asia, and it has been introduced into some parts of central and eastern Europe on account of its value as a cattle-food. The beans have long been exported in large quantity from Manchuria to Japan and southern China.[1] The cultivation of this bean has been introduced with success into the cotton belt and the southern part of the maize belt of the United States. **Soya**, an extract from soya-beans, is also exported to Europe, and especially to England, to be used as an ingredient in soups and sauces, but much of the so-called soya is manufactured in Europe itself from various mushrooms. Here also may be mentioned the **ground-nut** or earth-nut (*Arachis hypogæa*, Linn.), so-called because the pod ripens underground, popularly known also either here or in America as the monkey-nut, pea-nut, or cow-pea, which, although cultivated chiefly as an oil-seed **(461)**, is also largely used as a fodder-plant and increasingly too as human food. It is of remarkably wide range in latitude, being grown from the heart of the tropics to as far north as 37° in the United States,[2] the northern limit of the cotton belt.

275. Among other pulses of more or less importance in agriculture and commerce are **lentils, vetches,** and **lupines,** all of which are cultivated for their pods in southern Europe and the Mediterranean region generally ; lentils also in India. **Lentils** are celebrated for the nutritious character of their seeds, and the meal derived from them is the basis of the invalid food advertised under the names of *Ervalenta* and *Revalenta arabica.* In central and western Europe vetches and lupines are cultivated solely for use as green fodder, lupines being a crop of special importance in certain localities, from its being adapted to very light, sandy soils.

276. The long flat dried pod of the carob-tree sold in our shops

[1] In 1908 a large export from the same source to Great Britain and other European countries began and developed with great rapidity, the beans being used partly as cattle food, partly as a source of oil to be used in soap-making and for other purposes, which still allowed the pressed cake to be available for cattle. Before the war the British import came largely from Russia as well as China and Japan.

[2] In that country it occupied in 1918 considerably more than 2,000,000 acres, and the production was nearly 56,000,000 bushels.

under the name of **locusts**, and sometimes called St. John's Bread, from the fact of its being supposed by some to be the locusts stated in the New Testament to have been eaten by John the Baptist in the wilderness, is the fruit of a tree (*Ceratonia siliqua*, Linn.) belonging to the Mediterranean generally, but especially abundant on the island of Cyprus. The pods have now become a very considerable article of export from that island, and are largely sent to England to be used for cattle-fodder. So rich are the Cyprus carob-pods in sugar that a sweet juice can be extracted from them capable of being used in preserving fruits, as well as for the other purposes to which sugar is applied. **Mezquite** is the name of several species of American trees of the genus Prosopis, producing a sweet pod something like that of the carob-tree. The most widely distributed species (*Prosopis dulcis*, Kunth), to which the Spaniards gave the name of the carob (**algarrobo**), after the similar tree of their own country, has pods nearly or quite two feet in length; but this is rather a tropical tree than a tree of the temperate zone. The species to which the name mezquite is given in North America (*P. juliflora*, DC., and *P. pubescens*, Benth.) have smaller pods, which, as well as the beans contained in them, are much relished by cattle. They are abundant in the north of Mexico and in the United States from Texas to California, and are spreading with great rapidity in western Texas, especially since forest fires have become less frequent.

277. POTATO. This important plant is one of the gifts of the New World to the Old. The cultivated species, which is known to botanists as *Solanum tuberosum*, Linn., and is hence a member of the same genus as our common weed the woody nightshade or bitter-sweet, is a native of the high and dry regions of the Andes from Chile to Venezuela, and its introduction thence into other countries has proved of immense importance on account of its extreme productiveness, its easy cultivation, and its remarkable powers of acclimatisation, varieties of this plant being capable of cultivation from the tropics to the farthest limits of agriculture, even beyond the polar limit of barley. There is much uncertainty as to the date of its introduction into Europe, and into particular European countries. It is believed to have been known in Spain in the first half of the sixteenth century, but Italy is said to have been the country into which it was first introduced (about 1560), and it was certainly cultivated in that country before 1600. It is commonly said to have been introduced into Ireland by Sir Walter Raleigh from Virginia in 1586, but this statement is certainly not accurate as it stands. It is certain that it was not Sir Walter Raleigh that introduced any plant from Virginia about that time, though colonists originally settled in America by Sir Walter Raleigh may have done so; but it is not at all certain that the potato was the plant then introduced—and, even if it was, it is not to be inferred that the potato was originally a native of Virginia. It is certain, too, that the plant first known in England as the potato

was not that which is now so called, but the batatas or sweet potato.

278. Whatever may be the truth as to the date of introduction, we know that it was long before the potato rose into favour as an object of agriculture in most European countries. In Ireland it was earlier cultivated than in Great Britain. In England its cultivation did not become general till the eighteenth century, and it was only in the latter half of that century that it came to be widely cultivated in Germany (where its cultivation is now more widespread than in any other country on the European mainland), as well as in France, Austria, and Hungary. It even required the exercise of the autocratic powers of Frederick II. of Prussia to effect its introduction into the sandy districts of Pomerania and Silesia. In north Germany the potato is said now to make up five-sevenths of the food of the working-classes, as it is known also to be the staple article of diet with the peasantry of Ireland.

279. Owing to the great bulk of this commodity compared with its value, the foreign trade in it is carried on mainly with neighbouring countries. The greater part of the import into the United Kingdom in 1913 was from the Channel Islands, France, the Netherlands, and Germany, the total value being more than £2,500,000 sterling.[1] In that year the Channel Islands, where the cultivation of early potatoes is rapidly increasing—above all, in Jersey, which is already almost one large potato-field—supplied about one-eighth of the import in quantity, but about one-fourth of the value. Germany and Ireland are the two chief producing countries.[2] About one-fifth of the potatoes produced in Germany is used for the manufacture of alcohol almost entirely for industrial purposes, and considerable quantities are also used for the manufacture of starch. A great extension of the trade in this commodity is likely to arise from the fact that a method of drying potatoes has been discovered which renders the product non-perishable and not liable to injury by frost or tropical heat, while retaining its qualities as food.

280. One great objection to the cultivation of the potato, it may here be mentioned, is its **liability to disease,** which in some years, as in 1845–46 in Ireland, has caused great distress in those countries which depend mainly on this root. It has been suggested as a remedy for this evil to introduce the cultivation of other species of potato (*Solanum*), which might prove better suited to the moist climate of western Europe than that which is a native of the dry regions of the Andes. Two species in particular have been recommended for that purpose, and have been more or less successfully subjected to experiment with the view of testing their suitability, both for separate cultivation and for crossing with the ordinary potato. One of these is *S. maglia*, Schlecht, a native of the moister parts of Chile, as far as

[1] In 1920 about twice that value for 55 per cent. of the quantity of 1913.
[2] In both the average production exceeds 0·6 ton per head.

44° or 45° S.; and the other *S. commersoni*, Duval, a native of Uruguay and the Argentine Republic, where it grows in rocky situations at a low level.

281. ONIONS are the only other vegetable the import of which into the United Kingdom is considerable enough to be separately entered in the 'Annual Statements.' They are largely imported from various European countries (above all, Holland), as well as from Egypt, &c. Other vegetables—turnips, mangolds, carrots, and parsnips, &c.—are for the most part of too little value in proportion to their bulk to bear the expense of distant transport, and hence are chiefly produced at home, turnips alone occupying in the United Kingdom an area four-fifths as large again as that devoted to potatoes. The total value of the import into the United Kingdom under the general head of 'Vegetables' in 1887 was less than that of both potatoes and onions separately; and even with the addition of pickled vegetables (imported mainly from Holland, but probably to a large extent of other origin) less than that of potatoes.

282. FRUITS OF THE TEMPERATE ZONE, including nuts and edible seeds. Of all the familiar fruits suitable to a climate like that of England, by far the most important in the foreign commerce of the country is the **apple,** which is largely imported from the continent of Europe, and still more largely from North America, including both the United States and the British possessions. Australasia has recently begun to contribute a portion of the supply. Notwithstanding the fact that there are over 250,000 acres in Great Britain [1] occupied by fruit-trees (chiefly apple-trees), the value of the import of apples is regularly more than three-quarters the value of that of oranges. There is also a considerable import of pears and plums and a smaller import of cherries, gooseberries, raw currants, and strawberries.

283. But the bulk of the fruit-trade of the United Kingdom is in **southern fruits**—so called from the fact of their being imported into Great Britain and the countries of central and northern Europe chiefly from the peninsulas bordering on the Mediterranean. The principal fruits comprised under this designation are oranges and lemons, grapes, currants and raisins, figs, almonds and edible nuts, chiefly walnuts and chestnuts. Some of these products, like the orange and fig, reach their northern limit near the southern coasts of Europe, whereas others advance far into central Europe; but, in the case of the British Isles at least, the chief imports of all of them are from countries that border at some part on the Mediterranean, though most, if not all, of them seem to have been originally introduced into that region from other parts of the world.

284. The orange (*Citrus aurantium*, Risso) is believed to be a native of China, where the tree is still cultivated with great care in the southern half of the empire. From China it had already spread

[1] The extent in Ireland is not stated in the 'Irish Agricultural Returns.'

to other parts of southern Asia before the discovery of the sea-way to that part of the world (**157**), and from some part of southern Asia it was introduced into Europe by the Portuguese in 1548. It is now cultivated in several varieties in a great many places in the tropical and sub-tropical parts of the whole earth, reaching its most northerly limit in Europe owing to the peculiarly favourable climate of the Mediterranean region (**619**). Its **northern limit** in North America extends in the west (in California) to about lat. 37° N., in the east to about 31½° N. In Europe its northern limit rises in western Portugal to about 40° N., and then, except in the valley of Andalusia, merely skirting the coast of the Iberian Peninsula, ascends to its highest, about 44° N., in the north-west of Italy. In Asia it begins in the west about lat. 37° (a degree and a half south of Smyrna), and sinks in the east to about 34°. In the southern hemisphere, the limit is about 35° S. The other species of the genus of commercial importance are the **lemon** (*C. limonum*, Risso), the smaller-fruited **lime** (*C. limetta*, Risso), and the large thick-rinded **citron** (*C. medica*, Risso). The last species was the first to be introduced into Europe (not long after the beginning of the Christian era), and owes its distinguishing name to the fact that it was known to the Romans as a tree abundant in Media (the tract on the south-east of the Caucasus). All the species appear to be native in India. Varieties of the citron ripen their fruit in Tirol to the north of 46°. A hardier species of the genus is the **kumquat** of Japan (*C. japonica*, Thunb.), which is grafted on a wild stock that remains uninjured by frost, and which is hence recommended for cultivation in those parts of the United States in which the ordinary orange could not be grown with success. It yields a small fruit resembling the orange in flavour, though slightly bitter.

285. More than half the entire quantity of oranges and lemons imported into the United Kingdom is derived from Spain, Italy—and more particularly Sicily—ranking next as the place of origin. France derives a considerable share of her supplies from Algeria (especially Saida, south of Oran). The United States import oranges chiefly from the West Indies and South America (especially Brazil); but, in addition to the imported supply, produce large quantities of this fruit within their own borders (**1292**). As regards quality, the Maltese, Jaffa, Azores (St. Michael), and West Indian oranges are the most celebrated, the last being considered by some to surpass those of all other places. In India the oranges of Nāgpur and the Khāsi Hills have a high reputation, in the Argentine Republic those of Tucuman. **Limes** are grown for export, and for the making of lime-juice, more abundantly on the West Indian island of Montserrat than in any other place. See also **1167**.

286. Figs can be cultivated in the Mediterranean region over a somewhat wider range than the orange, the tree which produces this fruit not being so sensitive as the orange to frost; but as a matter of

fact they are grown for export mainly in the eastern part of the Mediterranean, and above all in Asia Minor, in the district lying to the north of those to which the orange is confined. The valley round Smyrna, which carries on no orange cultivation, produces figs of peculiarly fine quality. Greece also produces excellent figs, both on the islands and the mainland; and so also does southern Italy. The necessity of cheap labour for packing the figs, which are exported almost exclusively as a dry fruit, is no doubt an obstacle to the cultivation of the fig, especially in those regions which are suitable also for the more valuable orange. The **apricot** is said to be to Syria what the fig is to Smyrna and Ephesus.

287. Grapes are of course produced wherever the vine is grown (**291**), but they are exported as a fruit chiefly from those districts which do not produce a grape suitable for wine-making. Large quantities of table-grapes are grown in this country, and elsewhere beyond the limit of regular vine-culture, in hot-houses or under glass. They are also imported from Spain (especially the south-east) and Portugal, and to a small extent from other countries. **Raisins** and **currants** are dried grapes. Raisins are imported into this country chiefly from Spain and Asia Minor, all other countries furnishing less than a tenth of the total British supply. (See also **1292, 1392.**) **Sultana raisins** are made from a seedless grape largely cultivated in Asia Minor and on some of the adjacent islands. **Currants** are the dried form of a still smaller seedless grape obtained from a variety of vine which appears to be one of the most exacting of all plants as regards soil and climate, and one that exhibits in the most marked manner the effect of local influences. The currant-vine is almost confined to the kingdom of Greece, and its product is the most valuable of all the exports of that kingdom. But even in Greece its domain is limited, and it is observed that, however carefully the vine may be cultivated, it is impossible to get an equally good fruit in all the different districts in which it is grown. The smallest, but sweetest and best flavoured currants are grown on the islands, and on the mainland it is observed that the best qualities are grown only at the head and on the south shore of the Gulf of Corinth. It was on this gulf, in the neighbourhood of the town of Corinth, of which the name currant is a corruption, that this variety of the vine was first cultivated on the Greek mainland.

288. Almonds, walnuts, and **chestnuts**—all, it would appear, originally products of the interior of Asia Minor, in the neighbourhood of the Black Sea—have all spread far west, and more or less north. Almonds are now chiefly imported from Italy, Morocco, and Spain, but are also produced in considerable quantity in France; and walnuts and chestnuts have penetrated much farther into the heart of Europe. These last two are not separately entered in the 'Annual Statements,' but they make up a large part of the unenumerated nuts used as fruit which are imported into this country chiefly from Spain and France.

Among other southern fruits more or less important in commerce are the **prickly pear,** the black-spotted pear-shaped fruit of a cactus, introduced into southern Europe from the drier parts of tropical America; the **black mulberry,** the **pomegranate,** and the **pistachio nut.** With regard to several of the fruits here spoken of, it may be mentioned that the foreign trade connected with them represents only a very small portion of the whole trade to which they give rise, seeing that in the countries in which they are grown, some of them, such as oranges, grapes, prickly pears, and figs, are not mere luxuries, as they are with northern peoples, but make up an essential and important part of the food of the people, and thus are the staples of a very large local trade both by sea and land.

289. WINE. From a geographical point of view, and more particularly, as will appear further on, from the standpoint of commercial geography, the vine is one of the most interesting of all economic plants. Its original home seems to have been somewhere in western Asia or the south-east of Europe. According to Hehn, the region from which it spread is the luxuriant country to the south of the Caspian Sea, part of the ancient Media. 'There in the woods the vine, thick as a man's arm, still climbs into the loftiest trees, hanging in wreaths from summit to summit.'[1] But it appears to be indigenous as far east as Afghanistan and as far west as the Carpathians.[2]

290. How early the must, or juice of the grape, was converted into wine we know from the Hebrew Scriptures; and the virtues of this product in process of time caused the spread of vine-culture wherever civilisation advanced along the shores of the Mediterranean, as well as eastwards through the drier parts of Asia. By Europeans the vine of the old World was introduced into America, where, however, there are native species (*Vitis labrusca*, L., &c.), now cultivated as wine-plants. The spread of vine-cultivation is still going on, and the vine thus rapidly extending over the whole domain suitable to it throughout the world.

291. The **limits** set to its cultivation by climate are somewhat rigorous; for though there are many varieties of the vine, as of all cultivated plants, there are none adapted—like some varieties of maize, for example—to a comparatively short summer. A moderately high temperature, extending far into the autumn, is essential to the maturing of the grape, so as to make it fit for wine-making. In Europe, a mean temperature of about 60° Fahr. in the month of September is one of the conditions of successful cultivation; and it is this fact chiefly which explains the form which the northern limit of the vine as a

[1] Hehn's *Wanderings of Plants and Animals*, p. 73 (Eng. ed.).

[2] Remains of vine-leaves have been found in prehistoric tuffs at Montpellier, and elsewhere in the south of France, and grape-pips round the lake-dwellings of Switzerland, while fossil relics both of the vine and fig (*Ficus carica*) have been found in the Quaternary travertine of Miliana in Algeria.

wine-plant assumes both in the Old World and the New. In western Europe, where the temperature is subject to moderating influences both in summer and winter (**55-6**), the northern limit is in about 47½° N., a little to the north of the mouth of the Loire, but it gradually rises eastwards as the summers get warmer, until in the western part of the republic of Poland it reaches its highest latitude anywhere in the world, about 52½ or 53° N. As we go still further east the summer in equal latitudes gets shorter though warmer, and hence the September temperature declines. Consequently, the wine-limit gradually sinks to the shore of the Sea of Azof, where it is lower than in the west of France. The extremely sunny character of south-eastern Russia causes it, however, once more to rise a degree or two, but it again sinks in Asia to about 40° or 41°. The corresponding limit on the American continent has a similar form, but exhibits the advantage belonging to Europe in respect of climate. It begins in California about 37° N., rises to above 42° N. in the Canadian province of Ontario, but declines again slightly in the United States. In the southern hemisphere the limit is about 40° S.

292. But while the range of cultivation of the vine is thus limited on the north and south, it is important to observe that the habit of the plant gives it one great advantage within those limits. The roots of the vine-stock penetrate the soil to a great depth ; and this fact, besides placing the roots beyond the reach of frost, which is important in those regions in which a summer of sufficient length is succeeded by a winter of great severity (as in some parts of Russia and central Asia), enables it to draw on deep stores of moisture, and thus without irrigation to flourish and to continue to produce its tender leaves, even in those parts of the Mediterranean in which the summers are nearly rainless and almost all other vegetation is then at a standstill (**66, 621**).

293. Lastly, with respect to the **range of the vine as a wine-plant,** it is to be noted that the limits above described are not fixed solely by climate. They are **fixed partly by commerce.** They are not the limits within which the vine can grow and yield grapes whose juice can be made into wine, but the limits within which wine of tolerable quality can be produced—that is, wine sufficiently good to have a commercial value. In former times the vine was cultivated as a wine-plant in the valley of the Severn, and in several of the southern counties of England, as well as north of its present limits on the mainland of Europe, but the advance of commerce bringing better wines from more favoured regions has caused vine-growing to be given up in those places. It was only the employment of a large amount of capital for the production of wines of high quality that made it possible for the Marquess of Bute to grow the vine for that purpose near Cardiff with good results in favourable years, and in the end the experiment was given up.

294. The amount and quality of the wine obtainable from grapes in different places vary greatly from different causes. In the first place, the **fruit of the vine is greatly affected by differences in the soil and climate.** A sunny climate without excess of rainfall is that which is best adapted to it, and hence it is often grown, especially in the more northerly districts, on hill-slopes exposed to the sun, the slope favouring the draining away of superfluous moisture. The excess of summer rains prevents the cultivation of the vine for vine-making in monsoon countries (**64**) such as India and China. The best soil for the vine is one both warm and retentive of moisture,—that is, one that retains enough moisture without being wet; and it is, no doubt, the combination of these characters that makes chalky and other limestone soils so suitable for viticulture. But, secondly, the preparation of wine of high quality from the must is an industry that demands great skill and many expensive appliances, and consequently is practised on a great scale only where the industry is of long standing, and where the state of industry is sufficiently advanced to afford the necessary capital and labour. And, thirdly, **the vine is subject to many diseases,** some of which have at times committed such ravages in vineyards as greatly to reduce, and occasionally almost to extinguish, the wine industry in certain districts. A **fungus** (*Oïdium Tuckeri*, Berk.) has since about the middle of the nineteenth century committed extensive ravages in the Mediterranean region, and almost destroyed the once famous vineyards of Madeira. Since about 1863 the vines of France and many other countries have suffered even more severely from an insect enemy—the now well-known phylloxera. In France alone upwards of a million acres of vineyards were reported to be infected by the disease due to this insect in 1885, and more than 2,000,000 acres had already been destroyed. Numerous vineyards have been replanted with American vines, not so liable to the attacks of the insect. The maximum area under the vine in France was that of 1875—about 5,980,000 acres. In 1902 it had fallen to about 4,334,000 acres, but at the latter date the vines were stronger, and in normal years much more productive relatively to area than at the height of the phylloxera ravages (about 1890).

295. The table on p. 137 will serve to indicate roughly the relative place of different wine-producing countries, and the changes that have taken place in recent years. It must be remembered, however, that vintages are very variable, in consequence of variations in the weather, as well as the attacks of the pests above named. In France, for example, the yield varies between extremes of about 100 and above 300 gallons per acre. On the average of the ten years 1876–85 the production in that country was 940 million gallons, but the production in 1875 was more than twice that average. The table gives an interesting comparison between a pre-war and a war period.

Average Annual Wine Production.

	Million galls. 1901–5.	1914–18.		Million galls. 1901–5.	1914–18.		Million galls. 1901–5.	1914–18.
France	1,126	878	Russia	?	?	Algeria	136	162[5]
Italy	840	819	Roumania	28	28[5]	Union of S. Africa	4[8]	12[9]
Spain	390	417	Bulgaria	44	17[6]	Australia	6	6
Austria	179	23[2]	Greece	?	66[7]	United States	31[8]	?
Hungary		?	Switzerland	26[8]	11	Argentina	—	99
Portugal	105[1]	93[3]	Czecho-slovakia	?	10[6]			
Germany	74	36[4]						

[1] 1901–3. [2] 1917–1918. [3] 1915–1918. [4] Yield of former Empire, but exclusive of Alsace-Lorraine. [5] 1914, 1915, and 1918. [6] 1918 only. [7] 1914–1917. [8] 1901–1904. [9] 1917–18 and 1918–19.

296. France does not only take the first place as regards the quantity of its wine-production. Its most celebrated wines—such as the **clarets** or Bordeaux wines, from the best vineyards of the basin of the Gironde ; **champagne,** grown on the chalk hills of the old province of that name ; and **burgundy,** named from another old province—are among the best of old wines. The last-named is grown at its best on the 'golden' slopes of the Côte d'Or, where that range looks down on the warm valley of the Saône, a valley sheltered from cold northern blasts by the Vosges Mountains and the heights of the Faucilles. France, as it has the largest wine-production in the world, has also the largest export trade in this commodity. Until the ravages of the phylloxera began there was only a trifling import to set against this large export, but since 1880 the wine imported into France has exceeded in quantity the amount exported, and the amount of the import is now regularly between two and three times that of the export. There is not, however, the same difference in value, the imported wine being chiefly an inferior commodity from Italy and the north-east of Spain. The explanation of this large import is twofold. First, the fixed habits of the people lead to a larger consumption of wine per head in France than in any other country, and hence demand an increased import when the amount of the home product is diminished ; and, secondly, France retains the reputation which it has long had in foreign countries, and especially in England, for its light wines, and hence imports a great deal of wine to re-export it as French, or to mix with wine of native production intended for export. Some of the wine now exported as French is even made from imported raisins and currants or is an entirely artificial product.

297. Of the **wines of Italy,** though some were celebrated in classical times, only a few are in any favour abroad (**972**). Some of the **Spanish wines** have long been in high repute, especially in England, the most noted being those strong southern wines which take the name of **sherry** (formerly sherris) from the town of Jerez de la Frontera, near the seaport of Cadiz, in which district the best sherry is still produced, as it was in the days of Falstaff. A greater quantity of wine, however, is produced in the north-east of Spain, in the provinces of Barcelona,

Zaragoza, &c. The wines of **Portugal** are chiefly grown in the basin of the Douro, and that which is exported is shipped at Oporto, chiefly for England, where it is known as port. Of the wines of Central Europe the most celebrated are those of **Hungary (890)**. **Germany,** though only sixth on the list in respect of the quantity of wine which it produces, is noted for the fine quality of the vintage of some of its valleys, and above all those of the warm valleys of the middle Rhine and its tributary streams, the Moselle and the Neckar. The celebrated Taunus wine is grown on the slopes of the hills that shut in on the north the broad flat valley between the Vosges and the Black Forest.

298. In the **United States** the cultivation of the vine is far from having attained the extent that might have been expected from the vast area which they afford with a suitable climate; but this branch of agriculture is now receiving more attention, especially in **California** in the west and New York in the east. The light Californian wines are the only ones that have yet attained a reputation in this country. In **Algeria** the spread of the vine-culture since 1878, when it was in its infancy, has been very rapid. The vine was introduced into what is now the **Cape Province** in 1653, soon after the arrival of the first European settlers. The part of South Africa where the first settlements were made has a climate very similar to that best adapted to the vine in Europe (**66**), and there it has proved very productive. Large quantities of the fruit are used as table grapes or converted into raisins. The production of wine is, however, increasing, but barely keeps pace with the increase of the population of South Africa, where the great bulk of the wine is consumed. A considerable proportion of the grapes is also used in making brandy and other spirits, but the production under this head has greatly declined. There is a government vineyard at Great Constantia near Wynberg, where experiments are carried out. The **Australian** production of wine is increasing, and several light wines of that origin have already found favour in the home market. Victoria, South Australia, and New South Wales are the chief states in which it is grown.

299. The **British trade in wine** is affected by the existence of a customs duty which varies according to the proportion of spirit contained in the wine. The countries from which the greater part of the British import is derived are France, Spain, and Portugal. A considerable proportion of the wine imported (about 8 per cent. on an average) is re-exported, being sent to all parts of the world. The quantity of wine retained for home **consumption** in the United Kingdom, relatively to population, steadily declined from ·56 gallon **per head** in 1876 to ·30 gallon per head[1] in 1886. For the sake of comparison it may be mentioned that in France the consumption in 1876 was rather more than 30 gallons per head; but that, it must be remembered, was the year after the unparalleled vintage of 1875. In

[1] The minimum down to 1900 inclusive.

the year following the rate was reduced to 28 gallons, and there has been a still further decline since.

300. HOPS. A slender-stemmed twining and climbing plant cultivated for the sake of its clusters of small greenish flowers, which are used as a seasoning for beer, to which they impart a bitter flavour. In cultivation it is allowed to twine round upright poles. There are two kinds of flowers on different plants, one which can and one which cannot produce seeds, and it is only the former that can be used for the purpose mentioned. The countries in which the plant is **most largely cultivated are England, Germany,** the **United States,** and **Czechoslovakia.** The average yield is very variable, but is always higher in England than in Germany.[1] Notwithstanding its large production, the United Kingdom regularly imports an amount equal to one-third of the home produce or more, the export being trifling. This fact might be expected to lead to still further increase in the extent of this crop, but the obstacle to any great extension consists in the fact that the **crop is a very exhausting one,** requiring to be grown only on the richest soil. It is **hence confined to only a few localities. In England** it is mainly grown in **Kent,** but the best quality is grown round Farnham, in **Surrey,** where the upper greensand, a geological formation very rich in mineral manures (**571·11**), comes to the surface. Besides Kent, the principal counties producing this crop are **Sussex, Hereford,** and **Hants.** It is not grown at all in the northern counties. Besides being grown only on rich soil, the crop is in England generally very plentifully treated with manure, so that the average quantity produced to the acre in this country is very much greater than the average produced anywhere else. The imported hops are mainly from the continent of Europe and the United States. **In Germany** hops are chiefly grown in Bavaria, and above all in the division of **Middle Franconia,** in the west of that kingdom, north of the Danube. Of late this crop has extended very rapidly in **Alsace-Lorraine.** In **Czechoslovakia** the chief hop-growing province is **Bohemia,** where some districts are specially celebrated for the excellence of their produce. The hop as a cultivated plant was introduced into England from Belgium (Flanders) only in 1525.

301. BEET. The common name for several varieties of a species of plants called botanically *Beta vulgaris*, Linn., and largely cultivated. They have large broad leaves and **long tap-roots,** and it is principally for the sake of the latter that they have been introduced into agriculture. One variety is extensively grown in this country, under the German name of **mangold** or mangel-wurzel, as food for cattle, like the turnip. Requiring a hotter and drier climate than this latter crop, it is mostly grown in the southern and eastern parts of England, and, being very sensitive to frost, it is banished from those

[1] In the ten years 1904–1913 the average yield varied in England from 5·26 to 14·21 cwts. per acre, in Germany from 1·67 to 6·02.

parts of the island in which the summers are short or the situation too exposed.

302. Another, and now a much more important variety, became in the course of the nineteenth century the great rival of the sugar-cane in the production of sugar. This variety is now cultivated over a very large and steadily increasing area in **central Europe, including the west and south-west of Russia.** Under the protection of high duties sugar is extracted and refined in the United States from beets grown in many states in the north and west,[1] and there are now hardly any parts of the world with a suitable climate in which sugar beet is not cultivated. As to British experiments see par. **676.** See also the Sugar Industry (**426-434**).

303. FLAX. Flax is a plant remarkable for the variety of useful products which it yields, as well as the variety of uses to which these products can be put, and hence is well called by botanists *Linum usitatissimum*, Linn. The most important of these products is the **fibre of the bast**, or inner bark of the stem, which is tall and slender like that of the cereals, but not unbranched. The fibre, which is from eight to upwards of fifty inches in length, is itself called flax, and, from the earliest times has been spun and woven into a fabric known as **linen** (from the Latin name of the plant). Manufactured flax fibres have been found in the remains of the pre-historic lake-dwellings of Switzerland. The oldest of all surviving vestments, the wrappings of the Egyptian mummies, are probably linen. The seed (**linseed**) is also of great value as yielding an oil largely used in mixing paints, and, in its greatest purity, in making varnish (**459**). The crushed cake that remains after pressing out the oil is an excellent food for cattle, and the seeds when ground afford the linseed-meal which is so much used medicinally. The **tow,** which is composed of the shorter fibres of the flax, those not used for weaving, is spun into twine and cords, and linen rags furnish the best material for paper-making.

304. Flax is grown through a **wide range of climate.** It thrives both in India and in the colder parts of Russia, but the chief commercial value of the crop arises only from one of its two products, either fibre or seed, not from both together. Where, as in India, the best seed (for oil) is grown, the fibre is nearly valueless ; and where the fibre is good, as in Russia, the seed is of less value, though in that country flax is grown both for the oil and the fibre. In Europe flax is grown most extensively in **Russia,** from which more than three-fourths of the entire British import of the fibre is derived ; but the best quality is that of Belgium (**800**). In Great Britain flax is now but little grown, but flax of excellent quality is still grown in large amount in the north-east of

[1] See the map illustrating the distribution of beet-sugar refineries in Russell Smith's *Industrial and Commercial Geography*, p. 270. The amount of sugar produced from beets grown in the United States increased from 51·6 thousand tons in 1899 to 673,000 tons or 73·1 per cent. of the total production of sugar from native grown material in 1918–9.

Ireland, in the whole of which island it is a culture of great antiquity. There the flax is not allowed to produce seed even for sowing, and the seed for this purpose is imported mainly from Russia but partly from Holland.

305. The soil best suited for the growth of flax for the fibre is one that is tolerably firm and moist. This latter circumstance is what renders the flat surface of Russia and Ireland so well suited for its growth. But there are other conditions besides soil and climate which have an important influence on the extent of flax cultivation. Flax is one of those crops which require the employment of **a good deal of labour on the field** before the fibre is ready for the factory. For the unprepared flax straw there is in England no market, and to be made ready for the market the flax has to undergo a number of processes which are apt to make extensive demands on the labour attached to a farm at a time when it is much needed for other purposes. In the first place, instead of being cut like grain, flax has to be pulled up by the roots. Next, if it has been allowed to seed, it must be **rippled**—deprived of its seed-vessels by means of an iron comb. After that the straw has to be **retted,** that is, steeped in water for about a month so as to soften the fibre and alter its character. The quality of the fibre depends largely on this operation, for which the water should be soft and stagnant or nearly stagnant. In Russia an inferior fibre is sometimes prepared by dew retting. Finally the straw is **scutched,** or subjected to the action of a machine with revolving blades, which gets rid of the woody core of the fibre.

306. It is the labour required for these processes that chiefly prevents the cultivation of flax in England and Scotland; but in view of the fact that the plant is quite suited for our climate, that the average value of the import of flax-fibre, linseed, and oil-cake (chiefly from linseed) into the United Kingdom is about £9,000,000, and that other branches of agriculture are declining in this country, an effort is now being made to extend the growth of flax among British farmers by making them acquainted with recently invented modes of saving labour in the operations above mentioned. In the **United States** flax is extensively cultivated, but almost exclusively for seed, the cost of labour for the preparatory processes being, no doubt, as in Great Britain, the chief cause preventing its cultivation for the fibre; for that country is one of the most important in the world for linen goods, and a linen manufacture, based on imported fibre, is developing there very rapidly.

307. Of the different flax products imported into the United Kingdom, that which has the greatest aggregate value is linseed; but the amount of flax fibre, including tow, annually imported is itself equal to the produce of 500,000 acres, or about ten times the acreage under this crop in Ireland. This betokens an extensive linen industry, the chief seats of which are the north-east of Ireland and west Fife

and south Forfarshire in Scotland. On the continent this industry is most highly developed in Germany (where Westphalia is most noted for the quality of its linens), Czechoslovakia (especially Bohemia), and Belgium.

308. Lawns and **cambrics** are among the special fabrics made from flax. The latter is named from the French town of Cambrai, where the manufacture is still carried on. The canvas of sail-makers, formerly, as the name indicates (**309**), made from the hemp-fibre, is now, in the United Kingdom at least, made chiefly from flax.

309. HEMP (*Cannabis sativa*, Linn.) is a plant **the bast** of which yields a **fibre** similar to that of flax, only coarser and stronger. It is hence used chiefly (in England almost solely) for **ropes and cordage,** and the fabric woven from it, which takes the name of **canvas,** from the Latin name of the plant, is principally used in making sails. The finer kinds of fibre are, however, used in making a cloth similar to linen, and hemp yarn, like linen yarn, is frequently combined with other yarns in weaving. Like flax, hemp is adapted to a **wide range of climate**; but the soil and climate best suited to it, when grown for the sake of the fibre, are similar to those required for flax, and the mode of cultivation and after-treatment of flax are likewise suitable for hemp. Hence the countries of chief production are the same. **Russia** stands first as regards quantity, but **Italy,** which comes second in quantity, has the reputation of producing the hemp of the finest quality (that grown round Bologna). In the United Kingdom hemp is even less grown than flax. In Ireland an inconsiderable quantity is produced, and in Great Britain its production is almost confined to the low alluvial lands of Lincolnshire, the clay flats of Holderness, and a few similar localities. In **India** hemp is very extensively grown, but chiefly for the sake of various stimulants derived from it (**1067**).

310. The term ' hemp ' is also applied to a number of other fibres, some tropical, some extra-tropical in their origin, adapted to the same uses as the true hemp fibre. By far the most important of these is that known as Manila hemp, a tropical product (**441**), and among other tropical products so called are sunn-hemp, deccani-hemp (**444**), and sisal-hemp (**440**). Among plants belonging to temperate climates, the so-called **New Zealand flax** (*Phormium tenax*, Forst.) is now sometimes more appropriately called New Zealand hemp, seeing that the fibre is much better adapted to the purposes of hemp fibre than to those of flax fibre. In this case the fibre is derived from the leaves, which are long and narrow like those of the yellow flag or iris. The plant grows very abundantly in New Zealand and is very easily cultivated, and as the leaves can be cut thrice a year without destroying the plant, it might be expected that the supply of the fibre would be plentiful. It thrives on inferior boggy soil, almost useless for other purposes, and it has been grown in several of the south-western counties

of Scotland. The use of the fibre in manufactures is, however, impeded by the difficulty in freeing it from a gum by which it is invested.

311. Of other fibre-yielding products of the temperate zone, the most important are the **common nettle** (*Urtica dioica*, Linn.) and **esparto.** The bast fibres of the former were pretty extensively used in spinning and weaving on the continent of Europe before the great expansion of the cotton industry about the beginning of the nineteenth century (**370-3**), and their use has recently been revived to some extent in Germany and elsewhere. The cloth made from it is known as **grass-cloth,** in the making of which, however, the tropical or sub-tropical fibres ramie and China-grass (**442, 443**) are the materials principally employed. **Esparto,** or, as it is called in North Africa, **alfa,** is the commercial name of various grasses (chiefly *Stipa tenacissima*, Linn., but also *Lygeum spartum*, Loefl., and *Ampelodesma tenax*, Linn.), derived from northern Africa (Algeria and Tunis) and southern Spain, and used chiefly in paper-making (**582, 585**). In Spain esparto fibres are also employed in making ropes and cordage as well as in plaiting.

312. WOOL. Wool is the name given to a kind of hair found in greater or less quantity on almost all mammals, on a few of which it forms the principal covering of the body. From ordinary hair it is distinguished by two important properties. First, while a hair is almost quite smooth on the outside, each fibre in wool is covered with minute **overlapping scales**, the edges of which are turned in one direction like those of the slates on a roof. These scales are, however, extremely minute, so that they cannot be discerned by the naked eye or by the touch, unless a woollen fibre be drawn between the fingers in the direction opposite to that in which the edges of the scales are set. Second, each fibre of wool is finely **crimped** or **curled,** so that when drawn out it becomes greatly lengthened, returning again to its original length when the strain is removed. It is the spring due to this curl which imparts to woollen fabrics that **elasticity** which distinguishes them from those made from cotton, linen, and other fibres. Another distinguishing property of wool is its power of **felting**—that is, of becoming matted in such a manner as to be capable of being made into a kind of cloth without weaving, but merely by rolling, beating, and other processes.

313. The animal that furnishes by far the largest proportion of the wool of commerce is the domestic **sheep,** the woolly covering of which is almost entirely a product of domestication. Several different species of wild sheep are indeed known, one of these, the mouflon, still surviving in a few of the mountainous parts of southern Europe; and some of the species of wild sheep which inhabit the elevated regions of central Asia are known to produce, like other natives of the same part of the world, considerable quantities of winter wool. But no wild species of sheep possesses the well-known woolly fleece,

which is one of the principal products for the sake of which the domestic sheep is reared. When the sheep was first domesticated it is impossible to say. This must have taken place at a period beyond the reach of history. The pictures on the ancient Egyptian monuments bear witness to the fact that the people of that country possessed the domestic sheep at a very remote period, though there are no pictures of this animal so old as some of those of the horse and ox.

314. In all countries suited for rearing it, the sheep is now the most numerous of domesticated animals, and in most of these it is chiefly for the sake of the fleece that it is reared. The **climate** best adapted to the sheep as a wool-producer is one that is comparatively dry and equable, or at any rate free from extremes of cold. The grassy tracts of the Mediterranean countries are accordingly peculiarly favourable to it (**66, 621**), and it was in that region that the **merino** sheep, the variety which now produces the finest wool in all parts of the world in which it thrives, originated. This variety, which is characterised by its dense and soft fleece, and fine but strong and very curly fibre, was **first known in northern Africa,** and was **thence introduced into Spain** about the middle of the fourteenth century. In Spain, which even in Roman times was renowned for the excellence of its fleeces, the variety was still further improved by careful rearing. In the seventeenth century the finest cloths of western Europe were all made from Spanish wool, and Spain retained its reputation for wool till long after that period. At the present day, however, Spanish wool, owing to the neglect which the sheep-rearing industry along with all others experienced for centuries in Spain, is far eclipsed by the produce of other countries, and in quantity it takes a very unimportant place in the commerce of the world.

315. The country which first bore the palm from Spain for its wool was **Saxony,** into which the merino sheep was introduced towards the middle of the eighteenth century. Upon the rearing of this variety the Saxon sheep-owners bestowed the greatest care, and in consequence of that care, rather than because of any superiority in climate, the so-called **'electoral'**[1] **wool,** rapidly attained the first place in the market. **Silesian wool,** produced in the Prussian province of Silesia, soon came to rival it from the same cause, and another rival is sometimes found in **Bohemian** (Czechoslovakian) **wool.** With regard to **English wool,** it must be explained that wools generally are classed in two great divisions (**327**), adapted for different purposes, the length of fibre or staple having been formerly the distinguishing character between the two, and it is mainly the long-stapled variety for which English wool has a reputation. The English breeds of sheep which take their names

[1] So called because in the eighteenth century Saxony was an 'electorate'—that is, its ruler was one of the princes entitled to vote in the election of the emperor of the old German Empire.

from the counties of Leicester and Lincoln are among the finest of the '**long-stapled**' class. To illustrate the effect of local conditions on the quality of sheep's wool, an effect which is very marked in many parts of the world, it may here be mentioned that, while these breeds produce in the counties named, and in Yorkshire and Notts, a highly lustrous wool, their fleece rapidly loses in brilliancy in other counties. In the middle ages wool was by far the most valuable of the English exports. It is still the principal agricultural export of the United Kingdom, and till recently this export tended to increase greatly in absolute, and still more in relative, amount, as is shown by the following table :—

Period	British wool, average annual amount in millions of lbs.		Percentage exported
	Production	Export	
1871–75	159	9·44	5·9
1876–80	152	11·78	7·7
1881–85	133	17·79	13·4
1906–10	136	39·57	29·1
1911–13	130	33·7	26·7

316. The following table, giving an estimate[1] at different dates of the production of wool in different parts of the world, will serve to show where the tendency is upwards and where downwards, at least so far as the wool of international commerce is concerned :—

—	Production in millions of lbs.				
	1873	1885	1900	1910	1913
United Kingdom	165	136	141	145	135
European Mainland . .	470	450	450	450	450
United States	175	330	301[3]	321	296
Australasia	193	385	514	782	770
River Plate[2]	248	356	398	457	353
Cape of Good Hope . .	49	50	46	131	149
Other sources (so far as received into Europe and N. America)	125	123	175	155	160
Total	1,425	1,830	2,025	1,941	2,313
Estimated *clean* wool after washing[4]	827	993	1,125		

[1] For 1873, 1879, and 1885 by Mr. A. Sauerbeck, in the *Jour. Stat. Soc.* 1886, p. 608, for the later dates by Messrs. Helmuth, Schwartze & Co.

[2] Argentine Republic and Uruguay. [3] North America.

[4] These figures are no longer procurable, being considered untrustworthy. Nevertheless the figures for previous years are left standing to give a rough idea of the difference in quantity between wools in different states.

317. The last line in the preceding table indicates a circumstance that greatly modifies the value of these figures for comparative purposes. The wool on the sheep always includes a varying proportion of **grease and dirt**, which must be removed before the wool is ready for use. Each fibre of the wool has a natural covering of grease, which is known as the **yolk**, and which on the living animal has the important property of preventing the wool from becoming felted. Occasionally the wool is scoured before export, but this practice, which is apt to result in the felting of the wool when packed in bales for long voyages, is becoming rarer. More frequently the fleece is washed to get rid of the dirt, the yolk being still retained. Very often, however, the wool is exported in its natural condition. The amount of clean wool, that is, the amount of fibre available for manufacturing purposes, thus varies greatly according to the difference of practice in this respect, as well as according to other circumstances affecting the condition of the wool.

318. Merino sheep were introduced into Australia about the close of the eighteenth century, and care has been taken to propagate them. They have thriven admirably, and **certain parts of Victoria and New South Wales now produce a wool unequalled for softness and lustre, and at the same time, unlike the original merino, very long in staple.** This wool now commands the highest price in the London market. As the merino sheep, however, yields very poor mutton, the growth of the trade in frozen mutton has led to the rearing of increasing numbers of sheep crossed with English breeds, yielding better mutton, and producing a different variety of wool.

319. For the Australian and South African wool the principal market is the British Isles, which derive from the colonies of the southern hemisphere, and more recently also from Argentina, a steadily increasing proportion of the wool required for the home manufactures. The different branches of the British woollen industry now make use of more than three times as much imported as home-grown wool. Of the total quantity of imported wool (including that which is re-exported) that of Australasian origin increased from an average of 60 per cent. in the ten years 1866–75 to nearly 70 per cent. in the ten years 1891–1900.[1] As in Australia, large numbers of cross-bred sheep have come to be reared in recent years in Argentina. A great deal of the best blood of British breeds has been introduced into the country, and the cross-bred wool of that country is now unsurpassed. The **chief markets** for the River Plate wool are France, Belgium, and Germany.[2] This is partly, no doubt, because the United Kingdom is so amply supplied by her own colonies ; but it is partly due to the fact that the River Plate wool, from the nature of the pastures, contains a considerable admixture of foreign matter, so that it requires

[1] In 1911–13, 64 per cent.

[2] In 1909 the Continent received 81 per cent., the United Kingdom and America each over 9 per cent. of the total.

special machinery to deal with it. Such machinery has been more generally erected on the mainland of Europe than in the British Isles, and by means of it French and Belgian manufacturers spin yarns which are used to make soft all-wool fabrics of high quality.

320. A few years ago London was almost the sole market for Australian wool, but in recent years wool markets have been established with great success in the chief Australian capitals. One result of this is that an increasing proportion of the wool from this part of the world is sent direct to Antwerp, Marseilles, Hamburg, and New York. Down to 1888 inclusive the largest number of bales of colonial wool sent direct to foreign ports was 94,000, or 5·8 per cent. of the total import into Europe and America.[1]

321. In the **United States** the **wool** is mostly of inferior quality, but efforts are now being made to improve it. The **Cape of Good Hope,** though not to be compared with the United States or the La Plata region as regards the total amount of wool produced, yields a large quantity relatively to population, and it, together with the other British possessions in South Africa, comes next after Australia in the amount of wool supplied to the British market. Several attempts were made to introduce fine-woolled sheep from Europe from about 1790 downwards, and about 1812 the rearing of merinos was fairly established in the colony. The South African wool is neither so fine nor so long in the staple as that of Australia.

Among the other countries from which the British Isles obtain supplies of wool the most important are India (whence the wool obtained is generally of poor quality, and used chiefly for making blankets), Russia, Germany, France, Holland and Belgium, Turkey, and Egypt.

322. The principal animals besides the sheep yielding materials for the woollen manufacture are the **goat,** the **alpaca** and **vicuña,** and the **camel.** The fibre derived from all of these is more nearly allied to wool than to hair, though there are gradual transitions between the properties of the one and those of the other fibre.

323. Of the varieties of goat, those most famous for their wool are the **Angora goat** and the Cashmere goat. The former is a native of the steppes of the **interior of Asia Minor,** and its wool, known as **mohair,** is remarkable for its length, fineness, softness, and silky appearance. The goat has been introduced with great success into **South Africa,** and mohair has long been an important export of Cape Colony. The **Cashmere goat** is the animal that furnishes most of the material for the costly Cashmere shawls, so called from having been first made in the kingdom of Cashmere or Kashmir. The material used in the manufacture is not the ordinary covering of the goat, but a fine

[1] In 1913 about 29 per cent. of the colonial wool clip was bought in London, either for the home trade or on foreign account; about 21 per cent. was imported direct from the colonial markets for consumption in the United Kingdom; about 4 per cent. imported direct to foreign ports; and less than 10 per cent. despatched to foreign ports by way of England.

downy under-covering which grows in winter on this and other animals (such as the yak) belonging to the higher slopes of the Himalayas.

324. The **alpaca** is an animal closely allied to the llama, and, like it, a native of the lofty plateaux of the Andes. It has long been domesticated for the sake of its wool, which is remarkably soft and elastic. This wool, though long used in spinning and weaving by the Peruvians, was at first found to be unsuited for spinning by the processes now used in the great manufacturing countries; but the difficulties in the way of its being so used were at last (about 1836) overcome by Mr. (afterwards Sir Titus) Salt, of Bradford, who thereby founded an important industry.

The wool of the **vicuña,** another ally of the llama and alpaca, is of even more value than that of the latter animal, but, since the vicuña is found only at elevations above 13,000 feet, it is not domesticated, and the supply of wool from this source is consequently small.

325. Camel's hair, formerly used chiefly for making painters' brushes, is now employed in the manufacture of coarse shawls, carpets, and various other fabrics, the yarn made from it being usually mixed, however, with other yarns. A fine and light-coloured camel-hair is imported from China, a coarser and darker-coloured kind from Russia, and as this latter kind is very strong and does not readily stretch it is largely used in making belting for machinery.

326. WOOLLEN MANUFACTURES. In point of antiquity the origin of the spinning and weaving of wool belongs to the same remote period as the industry in cotton and linen. In point of extent the woollen industry is, in temperate countries at least, the great rival of the cotton industry, and in most of them is the more important of the two. In temperate and cold countries, in which close-fitting garments are worn, wool is much the most suitable material for clothing, not only because it is a bad conductor of heat, and woollen clothes consequently retain the heat better than others, but also because moisture is less readily absorbed by the woollen fibre, and perspiration more readily passes through woollen tissues than through tissues of another kind. Where, as in the tropics, and in warm countries generally, clothes are worn more loosely, this circumstance is of less consequence. It is natural, therefore, to find that in all temperate countries, except China and Japan (**1111, 1126**), wool is the principal clothing material, and its use is further promoted by the fact that such countries also furnish the raw material of the manufacture.

327. The treatment of wool in manufactures is in many respects like that of cotton, but some differences require notice. First of all the wool has to be thoroughly freed from the yolk or natural grease which invests it, since that would prevent it from taking the dyes, and otherwise interfere with the processes which it has to undergo. Dyeing may follow, and then the fibres may be oiled artificially to make them more easily workable. The nature of the next steps depends upon

the use to which the wool is to be put, or more particularly upon the kind of yarn that is to be made from it. Formerly all long-stapled wools (**315**) were combed, or so treated that the fibres were laid as nearly as possible parallel to one another, and were then spun into a kind of yarn known as worsted, which is used in hosiery and in the manufacture of fabrics which have not to undergo the process of fulling. All short-stapled wools, on the other hand, were carded and spun much in the same way as cotton, and the yarns so made were the only ones capable of being used in making milled or fulled cloths, in which advantage is taken of the felting property in wool to thicken and shrink the cloth after weaving, and afterwards by means of teasels to raise the nap of the cloth in such a way that, in the most highly finished fabrics, a uniform surface is presented to view without any appearance of the intercrossing of fibres that takes place in weaving. All kinds of wool were therefore formerly divided into combing and carding or clothing wools, according to the purpose for which they were fitted. Machines have been invented capable of combing wools having a staple as short as one inch, and, on the other hand, wools with a staple of as much as five inches long may be used in making milled cloth. Wools are still divided into combing and carding or clothing wools, but the former term is no longer synonymous with long-stapled, the latter with short-stapled wools, and the distinction as between wools is no longer so absolute as it once was. But the distinction between worsted yarns and carded or clothing yarns still holds good, and it is to the industry concerned with the latter that the term 'woollen manufacture' is specially applied.

328. Among the principal varieties of woollen cloth in the special sense of the term are: (1) broadcloths, so called from the great width of the web, the finest quality of cloth; (2) cashmeres, a fine thin twilled fabric, much used for ladies' dresses; (3) tweeds, a fabric of looser texture than broadcloth and less highly milled, first and still mostly made in Galashiels and other towns belonging to the Tweed basin, chiefly used for men's clothing; (4) doeskin, a strong twilled cloth also used for men's clothing. Blankets, flannels, Scotch bonnets, and some kinds of shawls also belong to the woollen manufacture in the narrower sense of the term.

329. The name worsted is said to be derived from the parish of Worstead in Norfolk, which may therefore be presumed to have been one of the places where the making of worsted was first practised. Merinos and serges are among the chief kinds of worsted fabrics made entirely of sheep's wool, but such fabrics are perhaps the exception among those in which worsted yarn is used, at least in the United Kingdom, this kind of yarn being mixed more frequently than carded yarn with yarns made from other materials. The fibres chiefly used for mixing with that of the sheep are mohair, alpaca, and vicuña wool, and camel's hair. Hosiery and the making of carpets may also be

classed as departments of the worsted branch of the woollen industry, though the best carpets (Turkey, Brussels, Axminster, &c.) are made on a ground of strong linen or hemp, and only inferior kinds (such as Kidderminster, Scotch, &c.) entirely of wool. Artistic hand-made carpets are produced in Ireland, chiefly in Donegal, and still more valuable ones in Persia and other eastern countries.

330. Besides woollen and worsted yarn another kind originally derived from wool is now employed in the woollen industry in the production of a coarse but cheap kind of woollen cloth. The raw material in this case is obtained by tearing up cast-off woollen clothing and woollen rags into fibres, which can be re-spun into a yarn, not very strong indeed, but capable of being woven. This material is known as shoddy when made from fragments of loose texture, and mungo when made from the remains of finer fragments, such as old dress-coats, tailors' clippings, and the like. This industry, besides using up all the available woollen rags of British production, has given rise in England to a large import trade in rags of this nature.

331. In the middle ages woollen manufactures attained their highest development in Flanders, which had the advantage of being within easy reach of abundant supplies of wool especially from England, and being able to send its manufactured products to the best markets by sea, river, and land. In the middle of the twelfth century Flemish woollens were already worn in France and Germany. A writer of the thirteenth century says that all the world was clothed in English wool wrought in Flanders. It was from Flanders that English kings at different times introduced artisans into England with the view of improving the woollen manufactures of that country. Towards the close of the eleventh century this was done by William the Conqueror; it was again done by Edward III. in the first half of the fourteenth century, and again by Henry VII. towards the close of the fifteenth.

332. England had already begun to export considerable quantities of woollen cloth in the sixteenth century, but the cloth was often, if not mostly, undressed and undyed, these finishing processes being performed in Holland as late as 1603, and for the finest fabrics down to the middle of that century. Early in the following century the woollen industry of England had risen to such importance that woollen manufactures formed upwards of 40 per cent. of the value of the exports, and about 1780 this industry is spoken of as having 'long been the glory of England and the envy of other nations.' Soon after that it began to share in the improvements brought about by the introduction of machinery into the cotton manufactures (**370**), but as the leading industrial countries of the world all form great markets for woollen goods, the British woollen industry (in the wide sense of the term) never acquired the predominance attained by the British cotton manufactures.[1] In 1907 the factories engaged in woollen, worsted, and

[1] See below, par. **708**.

shoddy manufactures in the United Kingdom employed about 261,000 persons, or a little less than half the number employed in the various branches of the cotton industry. Nearly half of these were employed in the woollen (including shoddy), the remainder in worsted factories. It is noteworthy, however, that native English wools are best adapted for the worsted industry, which helps to account for the fact that it is in this branch that England has long maintained a special reputation, as is well shown by the character of our export trade in wool products.[1]

British Exports in millions of lbs.

Average of years	Woollen yarn	Worsted yarn	Alpaca and mohair yarn
1862–66	1·5	27·8	1·5
1901–05	1·8	51·2	19·0
1906–10	2·7	55·4	16·3

The export of combed wool made up into bundles known as tops increased from 6·4 million lbs. in 1890 to a maximum (down to 1920) of 44·8 in 1912.

British Exports in millions of yards of woollens and worsteds, exclusive of blankets, carpets, flannels, and druggets.

Average of years	Woollen tissues	Worsted tissues
1857–61	25	134
1896–1900	52	113
1901–05	56	103
1906–10	83	91
1911–13	101	71

The maximum export of the principal worsted tissues (' worsted stuffs, mixed and unmixed ') was in 1872, when the excessive stimulus given to our textile industries by the interruption to continental industry due to the Franco-German war reached its culmination.

333. In certain parts of the European mainland it is now customary to have woollen yarns, as well as wool and woollen fabrics, ' conditioned '—that is, tested as to weight, measurement, and condition in recognised establishments for the purpose. The submission to this test is voluntary, but so general is the practice that at Roubaix, where there is one of the largest of these establishments, the amount of yarn conditioned increased from less than 200,000 lbs. in 1858 to about 63,000,000 lbs. in 1887. A similar establishment was opened at Bradford, Yorkshire, in 1891, and is provided with ingenious testing apparatus partly due to local invention.

334. SILK. Next to wool, silk is the most important of animal products used in weaving. The great bulk of the silk of commerce is derived from an animal called the **silkworm,** but which in reality is the caterpillar stage of a kind of moth, whose favourite and best food consists of the leaves of the white mulberry (*Morus alba*, L.). It is hence called *Bombyx mori*, or the mulberry bombyx. In the body of the silkworm the substance that becomes the silk fibre exists in the form of two jelly-like masses, which harden on exposure to the air.

[1] The year 1862 was the first in which the British export of woollen yarns was distinguished from those of worsted and alpaca and mohair yarns; 1857 was the first in which woollen and worsted tissues exported were so distinguished.

When the worm is about to pass into the still condition which answers to the chrysalis of a butterfly, it sends out this substance by two minute openings at its head, and the two streams, at once uniting, form an extremely fine thread, which the worm coils round it, so as to form what is called a cocoon. From the cocoons the silk of commerce is directly obtained, but the thread of a single cocoon is much too fine for use in spinning and weaving, and hence in reeling off the fibre the threads from several cocoons are united, individual threads being sufficiently adhesive to make this an easy matter. For the finest qualities of silk fibre, the product of from five to seven cocoons is used ; for coarser qualities, the product of eleven or twelve, or even twenty or more.

335. After being reeled off from the cocoons the silk is made up into hanks, and in this condition forms the raw silk of commerce. The outer husks of the cocoon and a part of the silk in the interior are incapable of being reeled off, and in addition to that numerous fragments of thread remain as refuse after the process of reeling. These are exported from silk-producing countries under the names of husks, knubs, and waste, and such material is now largely employed in the manufacture of silk fabrics, especially in the United Kingdom. Cocoons also are exported, but generally in comparatively small quantity ; for since 100 lbs. of cocoons yield only about 9 lbs. of raw silk, it is obvious that the carriage of the silk in the latter form must be much more economical than in the form of cocoons (**205**).

336. Since mulberry-leaves form the principal food of the silkworm, the animal can be reared in all climates in which the mulberry thrives. Silkworms are usually reared under cover, the trees being stripped of their leaves in order to supply them with food, and the animals can thus be protected from cold and other influences of the weather that might be injurious to them. The range of climate suitable for silkworm rearing is consequently a wide one. Still, the character of the climate is very important. The health and productiveness of the caterpillars are greatly affected by the temperature, and as the rearing of the insect from the egg to the formation of the cocoon is completed within seven weeks in spring, there are great fluctuations in the amount of raw silk produced, according as the weather is genial or not. In China the rearing of the ' worms ' begins about the beginning of April, and the yield of silk is apt to be greatly diminished if during that month the temperature sinks much below 60° F. But the geographical distribution of raw silk production does not depend solely on climate. This industry is almost confined to the Old World, and indeed to Asia and Europe, notwithstanding that there are many regions elsewhere in which the climate is all that could be desired for the purpose. This limitation in the range of production arises from the nature of the labour connected with the industry. The tending of the silkworms previous to the spinning of the cocoons, and the subsequent operations

necessary to prepare the raw silk for the market, demand not only a considerable amount of labour, but likewise the utmost carefulness and delicacy on the part of those employed. Silk-rearing is therefore generally confined to those parts of the world in which the labourers are not only content with low wages, but have inherited from previous generations a capacity for watchfulness and delicate manipulation, and have been trained in these habits from a very early age. Nevertheless the production of raw silk is increasing in the United States, where the mulberry is frequently grafted on the osage orange (*Maclura aurantiaca*, Nutt.) for the purpose.

337. In all probability it was in **China** that attention was first given to the rearing of silkworms, and that silk manufactures were first carried on, and it is that country in which the production of silk is still most extensive. Chinese history or legend ascribes to Si-ling-she, who is said to have lived about 2700 B.C., the honour of having discovered the art of spinning and weaving silk; for which discovery she has been canonised, and is still in China worshipped as a saint. The rearing of the silkworm is generally distributed over the empire, but is principally carried on in the middle provinces (about latitude 30° to 35° N.), and in the southern province of Kwang-tung. In addition to the produce of the carefully reared and tended mulberry moth, there is a large amount of silk obtained in China (in all about one-fourth of the whole product) from various other moths, and from the mulberry moth in a state of nature. About one-fifth of the total export of silk from China is classed under the head of **wild and coarse silk.**

338. Next to China, the country which produces the largest amount of silk, both for home consumption and for export, is **Japan,** the export of which country is from one-third to one-half of that of China. The production of raw silk in Japan is subject to greater fluctuations than in China, a natural consequence of its more northerly latitude and greater liability to cold springs **(336)**; yet on the average the amount of the silk export from Japan increased on the whole more rapidly than that from China. This may fairly be ascribed to the greater readiness of the Japanese to adopt European inventions, but it may be noted that the Chinese have at last been compelled to adopt steam filatures instead of continuing to reel all their silk by hand.[1]

339. In **India** the rearing of the mulberry silkworm appears to have been introduced as early as the sixth century of our era, but the industry is far from having attained the importance which it possesses in China and Japan. The mulberry is chiefly cultivated in Bengal, where the East India Company made special efforts to foster the production of silk as far back as 1767. Soon Bengal silk became an

[1] In 1894 China exported 4,344 piculs of filature silk, against 79,000 piculs of hand-reeled silk; in 1911 the export of filature silk had risen to 55,400 piculs, against 40,700 piculs of hand-reeled. (One picul = 133⅓ lbs.)

important article of export, and the production of silk was further stimulated by the fact that the Company itself erected silk factories in the province. Since then the rearing of silkworms has been a stationary, if not a declining, industry in India, and the export of raw silk scarcely balances the import. In India, also, considerable quantities of silk are obtained from other moths, one or two species of which are sometimes domesticated, though for the most part they are left to themselves. These 'wild' moths are principally found in Assam, the Central Provinces, and the more sparsely peopled region in the west of Bengal. The general name of tussur silk is given to their produce, and most of the silk so called is distinguished by its natural fawn colour. Wild silk, chiefly derived from various species of *Anaphe*, is also produced in different parts of Africa.

340. The export of silk from Indochina is quite insignificant, though there, also, there must be a large local production. More important is the export of Persia, where the rearing of the silkworm, now principally carried on in the narrow strip between the Elburz Mountains and the Caspian, is said to have been introduced about the same time as it was into India. In an earlier period the Persian silk was widely celebrated, and was the foundation of an extensive trade with western Europe. Of other Asiatic seats of silkworm-rearing the principal are Transcaucasia, Asia Minor, and Syria.

341. Herodotus is the first European writer who is believed to have referred to silk, if, as Richthofen conjectures, the Median garments of I. 135, VI. 112, were of this material. In the early days of the Roman Empire silk had already come into use as a material for garments worn by the rich, and before the commencement of the Christian Era the raw material had been imported into Italy, where it was woven into tissues. But it was not till the sixth century A.D. that Europe was able to make a beginning with the rearing of silkworms. Justinian, who was at that time emperor of the East, and his consort, Theodora, encouraged the new branch of agriculture, of which Greece, and more particularly the Peloponnesus, became the principal seat. The peninsula just named is said to have obtained its modern name of Morea from the Greek word for a mulberry-tree. Greece continued to be the principal seat of silkworm-rearing in Europe down to the twelfth century; but meanwhile silkworms had also been introduced by the Arabs into Sicily and Spain, and during the Arab (Moorish) domination in southern Spain the production of silk was very extensively pursued. In all the places just mentioned the rearing of the silkworm has since sunk to a subordinate place compared with that which it has achieved in other parts of Europe. It still flourishes, indeed, in Murcia and Valencia in Spain, in various parts of Greece, and in other parts of the Balkan Peninsula; but the total estimated production of all these regions does not amount to one-tenth of that of Italy, which now furnishes, on an average, three-fourths of the silk

produced in Europe. And now in that country the great silk-producing region is not the island into which the silkworm was first introduced, but the great plains of the north, Lombardy, Piedmont, and Venetia, in many parts of which the long rows of mulberry-trees, stripped bare of their leaves in summer, are a speaking reminder of the nature of the industry pursued in the neighbourhood.

342. Next to the Italian production, that of **France,** chiefly carried on in the valley of the Rhone, is the largest in Europe. Between 1874 and 1885 the amount of the French production was, on an average, only about one-fourth of that of Italy, but twenty years previously to the earlier date the production of France exceeded the Italian, having been five- or six-fold its present amount. In 1856, however, the business of silkworm-rearing in France began to be adversely affected by the outbreak of a **disease** among the worms; and the ravages of this disease, which at a later date spread to Italy, Spain, Greece, and even the silk-countries of the Far East, were such as to bring down the silk-production in France in 1876 to less than a tenth of what it was in 1853. Since 1876, however, matters have begun to improve, chiefly in consequence of an important service rendered to the industry by science. The distinguished French chemist **Pàsteur,** being appointed by the French Government to inquire into the nature and origin of this disease, discovered that by examining the moths with the aid of the microscope it was possible to distinguish those which laid healthy eggs. Since then the microscope has been recognised as an indispensable instrument in the rearing of silkworms. Each moth is caused to lay its eggs on a separate piece of linen in a corner of which the moth is afterwards wrapped. If afterwards the moth is found to shows signs of disease the eggs are destroyed. While France has been able thereby to check the ravages of the disease, other countries which received it later have had the means of checking its spread before the evil attained the dimensions that it did in France.

343. Just before the late war the supply of raw silk in the markets of Europe and America was yielded by different countries in the following proportions :—China, upwards of 40 ; Japan, about 20 ; Italy, rather less than 20 ; the Turkish Empire, about 6 ; France, about 3 ; Austria-Hungary, the Caucasus, and Persia, each less than 2 per cent.[1]

344. SILK MANUFACTURES. The silk fibre as it is wound from the cocoon, being a continuous thread, does not require to go through the processes necessary in spinning wool, cotton, and other fibres. The making of true silk yarn is known as **throwing,** and consists merely in giving the fibre a slight twist, which enables it to combine better with other fibres. For stronger fabrics several fibres of raw silk are

[1] In 1919 the production of raw silk, 61 millions of lbs., was nearly equal to that of 1913, and to this total eastern Asia contributed 86 per cent., Europe 10 per cent., and the Levant, with central Asia, 4 per cent.

united, being twisted into a fine cord. The processes undergone by silk waste (**335**) to convert it into yarn are essentially the same as those adopted in spinning the other fibres mentioned above. The yarn so made is distinguished as spun silk from the thrown silk made by the other process.

345. Of the specially named fabrics made from silk, the chief are satins and velvets, the former being tissues so woven that almost the only threads appearing on the outer or 'right' side of the tissue are weft threads, which present a uniform glossy surface ; the latter, tissues in which the outer surface presents to view a short soft pile, made by passing the warp threads over fine wires, which are afterwards drawn out. The loops then remaining are either left as they are, in which case the tissue is called pile velvet, or cut to form cut velvet. This fabric is now imitated in cotton and mixed tissues.

346. Though Italy was one of the earliest seats of the silk-manufacture in Europe, and though during the middle ages this branch of industry developed to a high pitch in Venice, Lucca, Genoa, Bologna, and other Italian towns ; though, too, that country, as we have seen, stands far ahead of all others in Europe in the production of the raw material, in the manufacture of silk fabrics it ranks far behind France, and its silk is exported mostly in the form of thrown silk. The higher branches of the silk industry are now, however, growing rapidly.

347. In silk manufactures **France now surpasses all other countries in Europe** to such an extent that the value of its products is about three times that of the country which stands second, Germany. The centre of the industry in France is Lyons, and the history of the industry in Lyons and the regions round offers some very interesting illustrations of the influence of political events, of inventions, and of fashion on the prosperity of manufactures, and the commerce depending upon manufactures. The silk industry of Lyons began to flourish after the capture of Milan by Francis I. of France in 1515, that monarch having then induced several silk artisans of Milan to settle in Lyons. Encouraged by that monarch, and at a later date by Henry IV., and favoured by the extension of silkworm-rearing in the valley to which Lyons belongs, the industry rapidly rose to a position of great importance, and the first blow inflicted upon it was due to the persecution by later French kings of the Huguenots, or French Protestants—a persecution which drove many of the French silk-workers out of France, and sowed the seeds of the industry in many other parts of Europe, even in Russia. From this blow, however, it revived, and about the beginning of the nineteenth century it received a great impetus from the invention in Lyons of the celebrated apparatus named, after its inventor, the Jacquard loom, for the weaving of figured patterns.

348. Originally invented for use in the making of silks, in which

tasteful patterns greatly enhanced the value of tissues worn only or chiefly by the rich, this apparatus has since been applied to looms constructed for the weaving of other fabrics (linen, &c.); but its principal application is still probably in the silk industry, to the development of which, especially in France, it has greatly contributed. More recently the silk industry in that country has passed through a crisis, due in a great measure to the effect of another invention upon fashion. Since the sewing machine has come into general use, the fashions of ladies' dresses have become more elaborate and more changeable, so that there has been much less demand for the fine and costly but lasting tissues which used to be the glory of the French looms. Silks of an inferior and less durable quality, and mixed fabrics having the appearance of silk, have been more sought after; and since the looms of Germany and Switzerland were more speedily adapted to meet the wants of this new taste, the French industry suffered greatly in the competition. Subsequently, however, the French manufacturers have begun to adapt themselves to the new requirements of the trade.

349. The **German silk industry** is carried on more or less in all the manufacturing regions of the country; but Krefeld, in the Prussian province of the Rhine, is the town which has its name most completely identified with this branch of manufacture. In **Switzerland,** Zürich and Basel are the chief seats of the manufacture, the former being most noted for its silk cloths, the latter for its ribbons. At Lyons, Krefeld, and elsewhere, there are **conditioning** houses for silk, similar to those for wool already referred to (**333**).

350. In the **United Kingdom** the silk manufacture is not nearly so highly developed as the other branches of the textile industries, and in the silk industry proper—that is, the industry in which thrown silk as distinguished from yarns spun from silk waste is employed, a great decline has taken place since the latter part of the nineteenth century. Of this decline there are several explanations. In the first place, the British Isles have not the advantage, like the chief silk-manufacturing countries of the Continent, of being able to produce any of the raw material as an article of commerce. Moreover, since the opening of the Suez Canal it has become less of a market for eastern silk. The industry has thus developed with more vigour in some of the regions in which the supplies of the raw material were more ready to hand; and when the duty on silks in this country was abolished, under the treaty with France in 1860, the British manufacturers found themselves completely beaten, even in the home market, by those of France.

The spinning of silk waste and the weaving of 'spun' or schappe silk have been growing in England, while the silk industry proper has been languishing. They are carried on chiefly in the seats of the great textile industries of the country (Yorkshire and Lancashire), not in the counties in which the original branch of the industry has long

been pursued (Cheshire, North Staffordshire, and Warwickshire, besides London).

351. Under the protection of a high duty, the silk manufacture has advanced with rapid strides in the **United States,** which now surpasses France in this industry. The chief seat of the manufacture is Paterson, in New Jersey, within fifteen miles of New York. As to artificial silks see **611.**

COMMODITIES (*continued*)

B. Sub-tropical Products

352. COTTON. Cotton consists of the tufts of woolly fibres which envelope the seeds of a shrubby plant. When the seed-vessel has opened, the tuft swells out to the size of an apple, and remains for a time firmly held by some of the withered parts of the plant, which partly close in upon it, but remain open enough for the cotton to be easily picked. The seeds are of about the size of small peas slightly flattened. Of all the products of a sub-tropical climate cotton is commercially the most important, and its importance dates back to the earliest times of which there is any record. The first mention of it is found in Indian books written more than eight hundred years before the Christian era. The first European writer who is known to have mentioned it is Herodotus, who wrote in the fifth century B.C., and speaks of a tree which he knew by repute as growing in India, and bearing instead of fruit a wool like that of sheep.[1]

353. The wide diffusion of the plant in pre-historic times is even more remarkable. While most of the chief cereals, along with flax and hemp, were introduced from the Old World into the New, and the New World gave to the Old maize, tobacco, and the potato, cotton was found by the earliest explorers, from Columbus to Cook, growing almost everywhere in the area in which it is now found.

354. At the present day its cultivation is almost universal in tropical and sub-tropical regions, but it is in the latter that it attains its widest extent. The United States, India, Egypt, and Brazil are now the most important places of production for this commodity so far as international commerce is concerned, and China is a very large producer of cotton for home consumption. In all these countries except India and Brazil, the districts where cotton is chiefly grown lie outside of the tropics, and in India, the cotton districts, though mainly tropical, are generally at least one thousand, and in some places two thousand feet or more, above sea level. Its northern limit in the New World is nearer 37° N., but in the Old World it is largely grown in Russian Turkestan to the north of 40° and even, in Chinese Turkestan, in the oasis of Turfan between 42° and 43° N., but this is at a level below that of the sea.

355. The cotton-plant is not, however, everywhere precisely the

[1] One cotton-plant, probably *Gossypium arboreum*, was certainly known at a very remote date in Egypt. See Parlatore, *Le specie dei cotoni*, p. 16.

same. The genus *Gossypium*, to which all the cotton plants properly so called are referred by botanists, is a genus containing several species which differ in size, in the colour of their flowers, and, what is most important from a commercial point of view, in the length, strength, and fineness of the fibre forming the tufts.

All the cultivated varieties are, however, now believed to be reducible to three species—*G. herbaceum*, Linn., and *G. arboreum*, Linn., both believed to be natives of the Old World, and *G. barbadense*, Linn., believed to be a native of the New World. The species now most widely cultivated, both in the Old World and the New, is *G. herbaceum*, for the *G. hirsutum*, Linn., the species to which the ordinary American 'uplands' cotton used to be referred, is now regarded as a mere variety of that species. It grows to the height of about four or five feet, and produces a soft and silky wool composed of fibres of moderate length, that is, from nine-tenths of an inch to an inch and a third long. It is a native of India, Indo-China, and the Eastern Archipelago, and has been introduced into all other parts of the world with a suitable climate —into the United States some time in the latter part of the eighteenth century. There it succeeds better than in its original home, yielding on an average a fibre of about one inch in length, as against one of about nine-tenths of an inch in India, and whereas cotton grown from Indian seed improves in the United States, that grown from American seed degenerates in India. It is the product of this species, as cultivated in the United States, that is generally known in the European markets simply as American cotton. The best of all cotton, however, is that derived from *G. barbadense*, and known as **Sea Island cotton,** from the fact that in the United States it was first cultivated on the string of flat islands which line the coast of Georgia and South Carolina. It is that which produces the cotton with the finest quality of 'staple,' as it is called—in other words, that which has the longest, finest, and strongest fibres, and which in the mass has the most beautiful appearance. The length of the staple in this species may be as much as two and a half inches, though the mean length is said to be only 1·6 inches. If allowed to grow on from year to year this species of cotton may attain the height of from fifteen to twenty feet; but being, like other species of cotton, cultivated mostly as an annual, it is seldom allowed to grow to a greater height than two or three feet. The colour of its flowers is yellow. This species appears to thrive best on a slightly saline soil and where there are saline ingredients in the atmosphere, and to require a greater amount of moisture and a longer period in which to mature than the ordinary species. It is still cultivated on the islands from which it takes its name, as well as in the northern parts of Florida, and has been successfully introduced into Egypt, Tahiti, the Fiji Islands, and some maritime districts of Queensland. A tree cotton known as **caravonica cotton,** said to be a hybrid between Sea Island and rough Peruvian cotton, has been grown

for a considerable number of years in tropical Queensland, and has been introduced into other parts of the tropics. Its fibre is of long staple, strong and moderately rough, and as the plant has to be resown only every eight or nine years, its cultivation is recommended by the small amount of labour involved. As to Cambodia cotton see **364.**

356. As regards climate, all the species of cotton-plant require for their successful cultivation a long summer free from frost, and with a moderate but not excessive amount of moisture. The cotton-plant is generally reckoned among those which prefer a dry warm soil, but it will put up with considerable differences in soil under diverse climatic conditions. To frost it is peculiarly sensitive; and as it generally requires about seven months to yield a paying crop, this fact alone has a great influence on the extent of its domain. Very equable warm but not excessive temperatures, especially during the period of most vigorous growth, appear to be those most favourable to the plant, and plenty of bright sunshine seems to be absolutely essential to the production of fibre of good quality.

357. In the United States the cotton-plant is for the most part confined to the south-east. At the date of the census report of 1880 there was little cotton grown to the west of 99° W., and little to the north of 37° N.[1] This region is that in which copious summer rains prevail (**1290**); but the areas of greatest production are at a considerable distance from the sea-coast, the rainfall in the maritime strips being generally excessive, except for soils of the lightest character. The mean temperature during the months in which the plant is most rapidly growing and maturing its produce—June, July, and August—is remarkably uniform throughout this region, that of June varying in different parts from 76° to 81° F., July 78½° to 83° F., and August 78½° to 81½° F. Cloudless days occur during June and July in the ratio of about 1 in 4 in the more maritime and easterly parts of this region, in the ratio of 1 in 3 in the more inland and westerly, and in later months more frequently. The total area of the cotton region of the United States is estimated at upwards of 700,000 square miles, or about eight times the entire area of Great Britain[2]; but the **belts of greatest relative production** are the Mississippi 'bottoms,' or strips liable to

[1] This is still true, but great changes have taken place within this area. Before the war of 1861–65 South Carolina produced about one-half the total cotton crop of the United States, and Georgia about one-fourth. In 1880 Texas was already among the leading states, and in recent years that state has sometimes produced about one-third of the whole crop. See also par. 365.

[2] Between 1879 and 1898 the area actually under cotton nearly doubled, rising from less than 20,000 to 39,000 square miles. In 1911–12 it was 56,300 square miles; in 1914 it was 57,550 square miles, and the yield 8,067 million lbs.; in 1918 the area under the crop was 56,078 square miles, and the yield 5,850 million lbs., which was the maximum of the four years 1915–18; in 1920, the area rose to 57,880 square miles, but in 1921 sank to 43,540. The price of Midland upland cotton in New York averaged 13·3 cents per lb. in 1913-14; on the 22nd of July 1920, reached 43·75 cents, but on March 1, 1921, had fallen to 11·65 cents. Comp. par. **30.**

occasional inundation on the left bank of the Mississippi from Memphis to Vicksburg, and the 'black belt of Alabama,' which runs from east to west across that state, somewhat to the north of its middle line. In this belt the use of manure for cotton was considered, till the latter years of the nineteenth century, quite unnecessary, and yet the yield was at least twice as great as the average of the United States generally. That average varies in different years from about 170 to 225 lbs. per acre. See also **126.**

358. On the uplands and the Mississippi 'bottoms,' where cotton is chiefly grown, the **soil** is generally rich in lime; and it is found that the extent of this branch of cultivation and the productiveness of the plant tend to increase, other things being equal, in proportion to the abundance of this constituent of the soil.

359. Throughout the United States cotton is, or was, generally planted in rows, the individual plants pretty wide apart to allow of cleaning the crop. In slave times this was done by means of the hoe, but now mule cultivators have come into universal use. In all the moister parts at least, the earth is ridged up at both sides about the roots to facilitate the escape of any excess of moisture. In recent years, however, the practice of thick sowing has been introduced, with the result of an increase of 30 per cent. in the yield. To a rather dry climate the cotton-plant has a certain power of adapting itself, yet an unusually dry season always involves a short crop, as an unduly wet one leads to a crop large in amount but deficient in quality. Among other things that have to be attended to in careful cotton-cultivation is, as in all other cases, the selection of the seed **(234)**; and, second, the treatment of the plant in such a manner that the fruit, and consequently the cotton lint, is produced in greatest abundance. Hence the bush is not allowed to grow too luxuriantly, but is prevented from producing too much leafage and stalk by pruning, and where necessary by topping, that is, removing an inch or two from the end of the stem. The time of sowing in the United States is the end of March or some time in April; the time of picking, from August to the end of the year, or, in the absence of frost, even later. Picking is done by hand, and is the most expensive operation in cotton-production. It is light work, however, in which women and children can be employed. The pre-war payment was at the rate of about 1*s.* 10*d.* to 2*s.* per cwt. of seed-cotton, which, if the lint be taken at one-third of the weight, is equal to about 0·65*d.* per lb. of ginned cotton. One picker will pick on the average 100 lbs. of seed-cotton per day. So far no picking machine has proved a general success.

360. The use of **manures** in cotton-growing in the United States began in the older cotton States, above all in Georgia and the Carolinas after the civil war of 1861–65, and has been gradually spreading ever since. Investigation has shown that the plant is one of those which in ordinary circumstances reward the outlay on fertilisers most

generously, and that it is chiefly ignorance and custom that prevent an even wider adoption of a more advanced system of agriculture. And in connection with this subject there is one fact of the highest importance to remember, namely, that the commodity of greatest commercial value furnished by the cotton plant is one that takes away from the soil comparatively little of its fertilising ingredients; so that if everything else were regularly returned to the soil, cotton, instead of being one of the most exhausting of crops, would be one of the least exhaustive. It is the seed that withdraws from the soil most of the important constituents, potash and phosphoric acid (**90**); so much so that the removal of one crop of cotton-seed impoverishes the soil to the same extent as the removal of ten crops of cotton-wool. Now it is an important fact that, though the oil derived from cotton-seed is becoming yearly an article of greater commercial value (**458**), the cake that remains after the expression of the oil contains most of the fertilising constituents of the seeds; and from inquiries which have been made in the United States, it would appear that **cotton-oil-cake** is by far the cheapest fertiliser which could be obtained in America. The cake may be used as manure either directly or by giving it as food to animals kept in cotton-fields. Of the other manures used in the cultivation of cotton, the most important are the offal of fisheries, abattoirs, &c., and superphosphates made from the phosphates of South Carolina, Tennessee and Florida.

361. In India the mode of cultivating cotton presents some curious and interesting contrasts to that practised in America. The period of the year during which it is grown is the same, since it is dependent on the rains of the south-west monsoon (**64**). But in the region of India where cotton is principally grown on a large scale for export, a region lying mainly on the peninsular plateau behind the Western Ghāts, which drain the rain-clouds of most of their moisture (**64**), the total rainfall is often in some parts rather scanty. Beyond this region cotton is grown, in extra-tropical India, chiefly in the United Provinces and the Punjab, where the rainfall is even scantier, but where there are extensive areas under irrigation. As regards temperature, the chief cotton-growing region of India differs from that of the United States in having the higher temperatures in early summer and apparently in having a smaller proportion of bright weather. In furnishing the following data for comparison, Akola may be taken as typical of Berar and Belgaum of southern Bombay:—

		May	June	July	August
Akola, 930 ft.	Mean temp. F.	93°	86°	80°	79°
	Percentage of cloud	19	62	85	80
Belgaum, 2,550 ft.	Mean temp. F.	80°	74°	71°	70°
	Percentage of cloud	34	77	88	85

362. On the table-land of India the scantiness of the rainfall is made up for by the peculiar character of the soil, which, from its colour

and from its being so admirably adapted for the growth of native cotton, is generally known as the **black cotton-soil.** It is derived from the decomposition of the basaltic rocks which cover so large a portion of the peninsular area of India. It is of great fertility, and is said to have borne crops for thousands of years without manure. In one important point this soil agrees with the best soils of the cotton region in the Mississippi valley, namely, in the presence of lime. Soft nodules of kunkur, containing carbonate of lime in the proportion of from 50 to 80 per cent., are scattered through it. But the characteristic which renders it of such peculiar value in a region with so dry a climate is its remarkable tenacity of moisture. Instead of allowing the rain to sink away like the best cotton-soils of America, it becomes during the rains a tenacious mud. In dry weather the whole surface of the ground where this soil occurs becomes seamed with interramifying cracks, between which the soil forms hard lumps, which still, however, retain water imprisoned in their spongy cells. Hence, wherever this soil prevails irrigation is not required for cotton-culture.

363. The **yield per acre** of cotton in India is generally much less than in the United States, being for the most part under 100 lbs. per acre. For this difference there are, no doubt, more reasons than one. Generally, though not uniformly, the better cottons have a prolonged period of growth. In those parts of India in which cotton cultivation is dependent on the summer rains, cotton cannot be sown till after the beginning of June, and growth is stopped by winter frosts in the north and on the black soils of the northern part of the tableland by the tearing of the roots through the cracking of the soil in the latter part of October. In southern Gujarat, east of the Gulf of Bombay, where the best native Indian cotton is grown, the picking does not begin till February. In southern Bombay, round Dharwar, sowing does not begin till August, and the picking goes on in March and April. In India, moreover, manure is even less used than in the United States, and the former country has not, like the latter, vast areas of new land to turn to when the old is more or less exhausted. The staple of Indian cotton is generally short, from $\frac{1}{2}$ to $\frac{7}{8}$ of an inch, as against one inch or more for the ordinary American cottons, and this renders it unsuited for most of the branches of the manufacture carried on in Lancashire. Picking in India is often paid for in kind, a certain proportion of the cotton picked, $\frac{1}{16}$th to $\frac{1}{4}$th, according to circumstances. Where paid for in money the usual rate is from 3*d.* to 5*d.* for 40 lbs. = about 0·22 to 0·36*d.* per lb. of ginned cotton. A woman will pick about 45 lbs. a day.

364. Of late years, while the quality of Indian cotton generally has been greatly improved, there has been considerable extension of the area under cotton, especially through irrigation in northern India as well as in the Central Provinces, and there appears to be the promise of a much greater increase in the production of Indian cotton of good

quality in the extreme south of the peninsula. About 1906 a variety of cotton known as Cambodia cotton was introduced from Indochina and has proved well suited to the red soils east of the Cardamom Hills, when irrigated and heavily manured. This cotton having a staple of one inch in length, is capable of being used as a substitute for American cotton, and this fact, together with its high yield of 500 lbs. per acre, has caused its cultivation to be eagerly taken up there. This cotton, good as its quality is, has a short season, being sown in October and picked from the middle of February onwards.

365. In Egypt the cultivation is necessarily confined to the areas of perennial irrigation (**1143**). The rich soil gives a higher average return than even the United States, though the yield has in recent years decreased from an average of more than 500 to less than 450 lbs. per acre (**1147**). The staple is from 1·2 to 1·5 inches, and the cotton, as indicated in the note below,[1] is the best grown on a large scale. This high quality is no doubt to be ascribed partly to the fertility of the soil, and partly to climatic conditions. The skies are mostly bright, and the temperature rises and falls during the period of growth with remarkable regularity, as is shown by the following figures showing the mean temperature at Cairo from March to October :—

	March	April	May	June	July	Aug.	Sept.	Oct.
Temp. F. . .	62°	71°	79°	84°	85°	84°	79°	74°

Egyptian cotton is sown in March or April, and the first picking, which is the best, takes place in September. The picking is done by boys and girls, who pick about 30 lbs. a day, for which they receive 5*d*., which is equal to somewhat less than ½*d*. for a lb. of ginned cotton. The combination of conditions met with in the Egyptian delta seems not to be found elsewhere. Egyptian cotton has been tried in Sind, where the climate is sufficiently bright and dry, but the quality there grown is inferior, probably in consequence of the high temperatures of the earlier part of the season. The excessive heat of Upper Egypt has been found to be prejudicial to the strength of the fibre grown there. Egyptian cotton has also been tried in Texas, but though the temperature curves of some parts of Texas (as at San Antonio) are wonderfully close to that of Cairo, in those parts the climate is not equally bright and dry. On a small scale Egyptian cotton has been grown under irrigation with fair success at Phœnix, Arizona, and in a few other parts of the arid region in the south-west of the United States.[2]

[1] The average price of cotton imported into the United Kingdom from the United States in 1913 was £3 per cental of 100 lbs., of that from Egypt £4·4, from Peru, £3·6, from Brazil, £3·2, and from India, £2·4; but in the case of India the figures do not fairly represent the relative value of Indian cotton, as only a trifling proportion of that cotton comes to this country, and that of inferior quality. The better Indian cotton goes mainly to Japan.

[2] See *Geog. Jour.*, vol. xlii., p. 332. It is estimated that the maximum area which could be devoted to this cotton in the U.S. is about 300,000 acres, of which 86,000 acres were occupied by it in 1918 (a year of war, however).

366. At the present day these three countries, the United States, India, and Egypt, furnish to the United Kingdom considerably more than nine-tenths of its total supply of raw cotton, although about a century ago the supply from each of these sources was either nothing at all or relatively insignificant. During the period 1786–90 the British West Indies furnished more than 70 per cent., the Mediterranean countries 20 per cent., Brazil about 8 per cent. of the total British supply; while the share of the United States and India together was under 1 per cent., and Egypt contributed nothing at all to the import from the Mediterranean. In the period 1886–88, on the other hand, when the total import had swollen from about 25,000,000 [1] lbs. to about 1,750,000,000 lbs., the share of the United States had risen to 75 per cent., that of the East Indies to 12 per cent., and that of Egypt to 9½ per cent., while the share of Brazil had sunk to 2¾ per cent., and that of the British West Indies to insignificance.[2] Brazil is thus the only country which still retains any great importance as a cotton-producer among those which had most importance a hundred years ago. Of the other countries from which Great Britain derives supplies of cotton the only ones that need be mentioned are Turkey (chiefly Asia Minor), Venezuela, Colombia, and Chile. Special efforts are being made to encourage cotton cultivation in various parts of the British Empire, more particularly in tropical Africa, the British West Indies, and the Egyptian Sudan.[3] The urgency of this has long been felt, but has been intensified since the outbreak of the war.[4] Large quantities of raw cotton are grown in Russian Central Asia (**1018**), but this is solely for Russian consumption.[5]

367. Now it is to be noted that it is to commerce alone that we owe the extraordinary development of the cotton-production in the United States and Egypt, and the great extension of this branch of cultivation in India. Of the cotton grown in Egypt almost the whole

[1] Not 250,000, as was stated by an oversight in the earlier editions.

[2] In 1913, 73 per cent. from the United States, 19 per cent. from Egypt, only 2½ per cent. from India, and nearly 3 per cent. from Brazil.

[3] See 'Cotton-growing within the British Empire,' by J. Howard Reed, in *Scot. Geog. Mag.*, vol. xxvii. (1911).

[4] Prof. J. A. Todd in an article in the *Manchester Guardian* (weekly edition, July 23, 1920) pointed out that the average annual crop of the United States in the five years 1915–16 to 1919–20 was only 85 per cent., that of India 93 per cent., and that of Egypt 73 per cent. of the corresponding crops of the previous five years. The urgency of the need for extended production induced the British Government in 1920 to grant £50,000 a year to the British Empire Cotton-growing Committee for experiments.

[5] The total consumption of raw cotton in the world (presumably in countries using modern machinery, the domestic consumption of China being left out of account) was estimated in 1890 at 5,228, in 1900 at 6,802 million lbs., about 85 per cent. of which was supplied by the United States. In 1902 the total amount of raw cotton imported from British tropical possessions outside of India was under 430,000 lbs., and nearly all that came from the West Indies. In 1913 the amount of raw cotton consigned to the United Kingdom from British East Africa was 11·2, that from British West Africa (chiefly Lagos and Nigeria) was 6·2, that from the West Indies 3·0 million lbs.

is exported to Europe. Indian cotton is also largely exported, and even yet (1921) Georgia and N. and S. Carolina are the only states of the Union which consume a large proportion of the cotton they grow.

368. The form in which the cotton is exported is that of bales, or large bundles of cleaned cotton, that is, cotton-wool freed from its seed by a process called ginning; and it is an interesting fact, illustrative of the variety of circumstances that affect the development of commerce, that the early extension of cotton-production in the United States was due to the invention of an improved process for effecting this purpose. Previously the process of getting rid of the seed was a laborious one, and hence one that demanded on economical grounds the cheapest available labour; and in 1792 so little was it thought probable that the United States would ever grow any considerable quantity of cotton, that, in negotiating a treaty with Great Britain in that year, the United States ambassador agreed to a provision (struck out, however, by the senate) which forbade the export of cotton from the United States to this country. In 1793 the invention of the saw-gin by Eli Whitney (an invention since then greatly improved upon) imparted such a stimulus to the cultivation of cotton in the United States, that that country rapidly became the chief source of supply of raw cotton in the world. The growth of cotton in India and Egypt received a great impetus from the scarcity of the raw material due to the civil war in America in 1861–65, and the effects of that impetus are still felt in both countries.

Inventions by which the processes of manufacturing cotton were cheapened have likewise been, as is well known, among the chief causes that contributed to the vast development of the commerce in this commodity in various forms; and it is a fact of great consequence in the history of British commerce that all the more important of these inventions originated in England.

369. COTTON MANUFACTURES. The early history of the cotton manufacture in Europe is far from being fully known. The Arabs are said to have introduced the cultivation of the plant into Spain in the eighth century. It is an ascertained fact that in the middle of the following century cotton manufactures on a pretty extensive scale were carried on in the Moorish towns of Cordoba, Granada, and Seville.[1] Augsburg is known to have exported cotton fabrics of its own manufacture in the fourteenth century. The first recorded importation of cotton into England was in 1298, for the making of candle-wicks (a manufacture, it must be remembered, of much greater relative importance in days when candles were the chief means of artificial lighting than now). In 1352 we find the first mention of Manchester cottons, but the fabrics so called were not what we know as cottons. Even as late as the seventeenth century a coarse kind of woollen cloth, a web

[1] It is no doubt to this fact that cotton owes its name, which is of Arabic origin.

of frieze, was known as cotton (Manchester, Kendal, and Welsh cottons of this kind are all mentioned), and the *New English Dictionary* expresses a doubt as to whether the term in this sense is of the same origin as the word in its present meaning. Later the term appears to have been applied to mixtures of wool and cotton or linen and cotton. That true cotton was used in Lancashire about 1640 appears from the fact that about that date there is mention of Manchester cotton buyers in the Levant. Pure cottons the English weavers were unable to make till long after. The use of cotton in manufactures extended very slowly. Between 1697 and 1749 the import of the raw material into England remained almost stationary, and there can be no doubt that about the latter date, and for some years after, the manufacture of cotton goods on the continent was greater than in England. A change in this respect was brought about by the inventions that took place in England towards the end of the eighteenth century, and revolutionised first the cotton industry, and ultimately textile industries of all kinds.

370. Without entering into details, for which we have no space, it is impossible to give an idea of the nature of these inventions, but a few dates are worth noting. In the first place, it may be mentioned that the most ancient method of spinning was by means of a distaff and spindle, the former an implement for holding the fibre to be spun, the latter for receiving the spun, that is, the more or less twisted fibre that forms the yarn. This arrangement was superseded by the spinning-wheel, the origin of which is uncertain. Not improbably it was used in the East long before it was known in Europe, but several forms of it appear to have been invented on the European mainland in the sixteenth century. Before the great era of inventions this machine had become common to the whole continent. The spinning jenny of Hargreaves, invented in 1764, patented in 1770, was the first machine by which more than two yarns could be spun at once. The water-frame of Arkwright (so called because soon after its invention water was used as a motive power in driving it) was an improved device for the same purpose, patented in 1769. In its improved form it is known as the throstle. The mule of Crompton, a sort of cross between the jenny and the throstle, patented in 1779, was a much better contrivance than either, and is the machine still most used for the spinning of weft yarns. These three machines changed in a great measure the condition of the cotton industry in Great Britain. The spinning-jenny was, indeed, an instrument that could be used in domestic spinning, and the chief effect of its invention was that the old spinning-wheel was thrown away into lumber-rooms, and the jenny adopted in its place, with the result of greatly increasing the output of yarn in each family. Arkwright's machine, however, was one more suitable for working in large factories; and factories began to multiply when, in 1785, it was declared that Arkwright had no

claim to the patents which he had obtained, so that any one might adopt the inventions that had been patented in his name. The result was, that whereas in the old days of the spinning-wheel the weaver might have to spend the morning going about to half a dozen cottages to obtain yarn enough to employ him for the rest of the day, there was now so much yarn produced that the supply greatly exceeded the demand. The hand-loom weavers were unable to use up the yarn that was produced.

371. The next step was the invention of the first power-loom by Mr. Cartwright, a clergyman having little knowledge of mechanics, and none of weaving. His first machine was patented in 1785, and an improved form in 1787; but even this second form had to be improved upon by further inventions before it could be made capable of weaving cloth as rapidly and cheaply as a hand-loom.

372. Since that date a new spinning-machine known as the **ring-spinning-frame** has been invented. It was first put in operation in the United States about 1832, but has only of late years been applied with success in the United Kingdom, where, however, it is rapidly growing in favour for the production of warp. In all machines, improvements in detail are almost uninterrupted, and all processes conducted by machinery have been greatly accelerated by the introduction of steam-power to drive the machines. This was first applied in the cotton-industry at Papplewick in 1785. In the case of spinning, the result of the change since the time of the early inventions is illustrated by the following facts. When the hand-wheel was still in use it required six or eight spinners to keep a weaver employed, and the earnings of a family amounted to only a few shillings a week. Even the mule was first employed as a domestic machine, and the earnings of a farmer in spinning were raised in some cases to as much as £6 per week. Before the close of last century the cost in wages of the production of a pound of yarn of medium fineness was reduced to less than a halfpenny.

373. All these inventions were extensively applied in England a considerable time before they were introduced on the continent of Europe. In applying them England was peculiarly favoured by its abundance of coal and iron, and its admirable situation for commerce (**692**). Moreover, the wars which raged on the continent of Europe from about the time when these inventions began to take effect down to 1815 interfered with the development of industry on the continent much more than in Great Britain. The consequence was, that England became pre-eminently the seat of the cotton industry, and even in 1801 manufactured more cotton than the entire continent of Europe. The value of cotton goods exported from Great Britain was officially estimated in 1785 at less than a million sterling; in 1815 it was estimated at upwards of twenty-two millions, and though, in accordance with what is mentioned in par. **47**, it must be remembered that these estimates give no satisfactory indication of growth in value,

they do indicate a very remarkable growth in quantity. Since then the volume of the British cotton industry has gone on increasing with but slight fluctuations. The volume of the industry is best indicated by the quantity of raw cotton entered for consumption in the United Kingdom, and in all the quinquennial periods from 1831–5 to 1906–10 there were only two in which there was a decline as compared with the previous period, the only considerable decline being in the period of the American civil war 1861–65.[1] On the average about four-fifths of the quantity of cottons manufactured in the United Kingdom are exported, and if the figures given in the Appendix showing the value of the British exports of cotton goods by quinquennial periods do not indicate this steady growth in volume, some light is thrown upon that by the table showing index numbers since 1871. The fact is that, so far as external trade is concerned, this country rapidly acquired and has since retained an unquestioned predominance in this industry, in spite of the fact that we are wholly dependent on imported raw material —a predominance that was never approached in the woollen industry, even when we had almost a monopoly of one of the most prized varieties of the raw material.

374. For this predominance are there any geographical reasons? In reply it may be stated that this predominance is due partly to the special natural advantages which we enjoy for the industry, as stated in par. **692**; partly to the general causes favouring concentration of an industry that is carried on on a very large scale; but still more perhaps to the fact that this is an industry that in a peculiar degree enables us to turn to account our great advantages for maritime trade (**708**). No class of goods has a wider market than cottons. They are consumed in all parts of the world.[2] From any one centre of production most of the markets must be reached from the seaboard, and for such markets no country has on the whole advantages equal to our own. All will admit that in turning these advantages to account in the cotton industry we have been enormously assisted by our free-trade policy.

375. Notwithstanding the general growth in the volume of the

[1] The average quantity of raw cotton annually delivered to the mills of the United Kingdom in 1856–60, 947 million lbs., in 1861–5 only 629 millions, in 1906–10, 1,835 millions.

[2] In illustration of the widespread distribution of the British cotton markets, it may be mentioned that in the year 1913, when the total value of the cotton piece goods exported from this country was nearly £98,000,000, although India and China were by far the most important markets, there were, even when Hong Kong is reckoned with China, no fewer than eighteen countries or parts of the world (India, China, Turkey, the Dutch East Indies, Australia, Egypt, Argentina, British West Africa, Canada, the Straits Settlements, Germany, Brazil, Switzerland, the United States, the Netherlands, Southern Nigeria, the Union of South Africa, and Japan) which each took British cotton piece goods to the value of above £1,000,000, and nine (Chile, French West Africa, Colombia, New Zealand, Morocco, Belgium, Cuba, Siam, and Uruguay) which each took such goods to the value of between £500,000 and £1,000,000. The countries are mentioned in the order of importance as markets.

British cotton industry there have been great changes in the destination of its products. In 1820 the continent of Europe received more than half of the total quantity of cotton fabrics exported from Great Britain, the United States (which then had less than one-fifth of the population contained by them in 1880) received nearly one-tenth, and Eastern Asia little more than one-twentieth ; in 1880 the continent of Europe received scarcely one-twelfth, the United States less than one-fiftieth, and Eastern Asia (chiefly British India) more than one-half of the whole. Of yarn Great Britain still supplies large quantities to the continent of Europe, but the proportion of the whole amount exported thither declined from above 95 per cent. in 1820 to 48 per cent. in 1891, though it has since risen[1] ; while eastern Asia, which in 1820 received no appreciable quantity of British yarn, received in 1891 33 per cent. of the amount exported, though the proportion has since declined.[2]

376. Such facts point to a more rapid growth of the industry in other countries, and, so far as Europe and the United States are concerned, that is very clearly indicated by the accompanying diagram, the data for which were obtained from p. 100 of Ellison's *Cotton Trade of Great Britain*, together with the data given in the same author's *Annual Review of the Cotton Trade*.[3]

377. The diagram shows that foreign competition is not merely a matter of recent years. The outcry on this head seems, indeed, to be peculiarly loud at present. This is possibly because foreign competitors were at first engaged in the easier task of conquering the home market, and have only recently begun to compete more keenly in neutral markets. It will be noticed that the diagram showing the consumption of cotton does not include all parts of the world that now work up cotton by machinery on a large scale. It does so for the earlier decades embraced by it. Before the middle of last century Canada was not worth considering as a consumer of raw cotton. Now it is. In 1868 it imported less than one million, in 1898 upwards of seventy millions of pounds of raw cotton for home consumption.[4] India, Japan, and China have also since entered the field as competitors in the machine cotton industry, and if their consumption of raw cotton were to be taken into account, the relative decline of the British industry would be seen to be still greater. The diagram, moreover, does not distinguish between the older and the newer seats of the cotton industry in the United States ; but with reference to the point now under consideration, the growth of cotton spinning in the southern states of the Union, as well as in India and Japan, is peculiarly instructive. In the southern states the number of cotton spindles increased from 1·2

[1] In 1901, 52 ; in 1910, 67 ; in 1913, 67 per cent.
[2] In 1901, 25 ; in 1910, 15½ ; in 1913, 16½ per cent.
[3] Kindly supplied to me by the compiler.
[4] In 1918–19, 125 million lbs. (including cotton waste).

to 4·8 millions between 1887 and 1900; in India from 2·9 to 4·9 millions between 1890 and 1901; in Japan from 325,000 in 1892 to about 1,000,000 in 1897.[1] In the case of the cotton industry of India and the United States the question of tariff hardly affects the matter. In India cotton yarns are admitted free, yet, in spite of dear coal, cotton spinning by machinery has been steadily growing there for more than half a century. The first mill was started in 1851. The geographical advantages of local supplies of raw material, abundant labour, and a

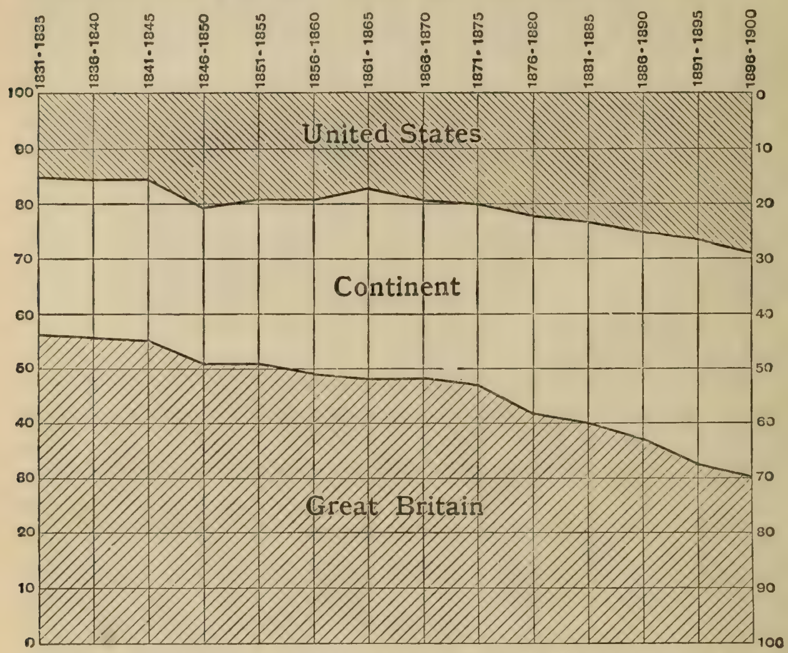


Diagram showing percentage of Cotton-consumption in Europe and the United States in quinquennial periods from 1831–35 to 1896–1900. The interval between two adjacent horizontal lines represents a consumption in the countries named of 10 per cent. of the total supply.

local market have been decisive. Japan has a five per cent. duty on imported yarns, and has, besides the local market, the advantage of local supplies of coal to counterbalance the necessity of importing the great bulk of its raw material. In the export trade it now not only competes with India in the Chinese but even in the Indian market. In the United States the southern industry competes chiefly with that of the north, against which it enjoys no protection. Again the preponderating advantages are geographical. The growth of the industry, particularly in India and Japan, has greatly affected the industry of

[1] In 1914, 6·2 millions in British India (in all India 6·8 millions, in 1917 about the same); in Japan in 1914, 2·4 millions, in 1920, 3·7 millions.

Lancashire, which has been compelled to turn its attention more and more exclusively to the higher (finer) counts of yarn, and the production of a greater proportion of woven goods for the Eastern markets—that is, goods in which the advantages of a more highly organised industry producing for a wider market can still tell. It is the increased production of finer yarns in the United Kingdom and the diminished production of the coarser yarns that accounts for the recent increase above indicated in the proportion of British yarns sent to the mainland of Europe, and for the fact that the number of cotton-spinning spindles in Great Britain is still much greater than in all the other countries of Europe put together.[1] A similar change has been brought about in the northern seats of the American industry by the development of the southern. But in neither case does the change stop there. Both India and the southern states of the Union are beginning to manufacture the finer yarns in greater and greater quantity. In 1900–01 more than 20 per cent.[2] of the weight of yarns produced in India was of counts above 20s. That, it is true, was a year in which the production of the lower counts was abnormally low; but the actual amount of the finer yarns spun in that year was in excess of that of the previous year, when the proportion was little more than 12 per cent. of the whole. A steadily increasing quantity of woven goods is now also being produced by mills in India. In the south-east of the United States of America and Japan, also, a steadily increasing proportion of spindles is being devoted to the higher counts.

378. In the spinning of raw cotton into yarn by the ordinary processes there is about one pound lost as waste in every six pounds of raw cotton, and there is further loss in the manufacture of cotton cloth. For some time this waste has been treated in large quantities on the continent of Europe in such a manner as to make it available for the spinning of either pure or mixed yarns, and this industry also has now been introduced into the United Kingdom. Cotton waste is also largely exported for wiping and polishing.

379. TOBACCO. The tobacco of commerce consists of or is obtained from the dried and otherwise prepared or 'cured' leaves of several species of a genus of plants known to botanists as Nicotiana, and now cultivated more or less in almost all parts of the world that have a warm enough summer. The use of tobacco in smoking and other ways is due to the presence in the leaf of a principle known as nicotine, which enables it to act as a stimulant and narcotic, but which, being an active poison, is capable of exercising most injurious effects if swallowed. Besides being used as a luxury, tobacco is used to a small extent in medicine, and more largely as a **sheep-wash** for the destruction of insects which infest the fleece. The species of tobacco

[1] In March 1914 in the United Kingdom 56 millions, on the mainland of Europe 44 millions.

[2] In 1918–19 nearly 35 per cent.; above 30s. nearly 4 per cent.

most usually cultivated is the *N. tabacum*, Linn., which grows to the height of from four to six feet, and produces several clusters of white or beautiful pink flowers.

380. The tobacco-plants are all natives of America, and the use of the leaf in smoking was widespread in that continent at the time of its discovery, in 1492. The practice was quickly adopted by the European discoverers, and by them was introduced into Europe, where, notwithstanding the prohibitions and denunciations of popes and crowned heads, it spread, at first slowly, afterwards more rapidly. In Europe the plant is said to have been first cultivated for its ordinary uses in Holland in 1615, but it soon extended to other countries. The increasing fondness of the people for the enjoyment of this luxury induced governments to encourage the cultivation for the sake of raising a revenue out of it. In Great Britain the cultivation of tobacco was forbidden at an early date for the sake of encouraging it in Virginia, where it became an important object of agriculture and article of commerce almost immediately after the foundation of the colony. In Ireland, the cultivation of the plant was allowed till the reign of William IV., when an Act was passed prohibiting it there also, for the sake of the convenience of raising the revenue ; and both in England and Ireland the prohibition was continued till 1886, when the cultivation of the plant was again allowed under certain conditions.

381. Like maize, barley, and potatoes, tobacco is adapted to very diverse conditions. It can be grown anywhere in the tropics, and has been cultivated with success even in some of the counties of Scotland. The period within which it comes to maturity varies according to circumstances, and the limitation of its range arises principally from the necessity of protecting it during growth against frost. This is particularly necessary in the early stages, when a single white frost is enough to spoil the whole crop ; and this is one reason that recommends the usual practice of sowing the seed in small beds, from which the tobacco is afterwards planted out in the fields, for in these seed-beds the seedlings can be sheltered from frost by being covered with dried leaves or some other light material. Stagnant water about the roots is also quickly destructive to the plants.

382. Adaptable as tobacco is to a great variety of conditions, it exhibits in a peculiar degree the effect of this diversity in the differences of the characteristic qualities of the product. The tobacco obtained from a variety of the plant adapted to one soil and climate is widely different from that which is obtained from a variety adapted to a different soil and climate. These diversities are well illustrated within the wide area of the United States, in which Wyoming was the only region that had no tobacco cultivation down to the date of the census returns of 1880. The chief tobacco states of the Union are, however, Virginia and Kentucky, between about 36° and 38° N.

383. At the present day the total tobacco-**production of** the **United States** is by far **the largest in the world,** and that country furnishes nearly 80 per cent. of the tobacco imported into the United Kingdom. Next in quantity of production ranks British India ; but the quality of native-cured Indian tobacco is generally inferior. Cuba, Brazil, the Philippine Islands, and Asiatic Turkey are the other non-European countries of most importance for the quantity or quality of the tobacco which they produce. Cuba is, above all, noted for the quality of its cigars, which take the name of Havanas, from the place of export. The high reputation of the cigars bearing this name was originally due to the aromatic quality of the tobacco grown in the district known as the Vuelta Abajo (to the west of Havana) ; but now, it is said, not one-half of the so-called Havanas of commerce are made even from Cuban tobacco, large quantities of tobacco grown elsewhere being imported into Cuba to be manufactured into cigars and then re-exported as genuine Havanas. Sumatra and British North Borneo vie with one another in producing the best cigar wrappers, a fact partly due to soil and climate, partly to care in treatment.

384. In Europe, the chief tobacco-growing countries in the order of the quantity produced are Czechoslovakia, Hungary, Germany, Russia, and south-eastern Europe generally; Hungary enjoys the reputation of producing the best quality. All these regions supply more or less of the British demand for this commodity. Under the regulations permitting the cultivation of tobacco at home, several crops were grown in 1886 in Kent and other English counties, and the experiment is said to have been a success so far as the quality of the tobacco is concerned ; but commercially the attempt to revive the cultivation of tobacco in England proved a failure. All but a small percentage of the tobacco imported into the British Isles is unmanufactured, the duty on manufactured tobacco (including snuff) being considerably in excess of that on the unmanufactured article.

The trade in tobacco, in so far as it is not a state monopoly, as it is in several countries, is largely under the control of two great trusts.

385. Relatively to population, the highest consumption of tobacco is in the Netherlands and Belgium, in both of which countries it is upwards of 6 lbs. per head per annum. Next come the United States, Cuba, Switzerland, Denmark, Argentina, Germany and Austria-Hungary. The average consumption in the United Kingdom is not a third of that in the Netherlands, and little more than a half of that in Germany.

386. OPIUM. Opium is the hardened juice of a cultivated species of poppy called *Papaver somniferum*, Linn., which is believed by some to be only a variety of the wild species *P. setigerum*, DC., a native of the shores of the Mediterranean. Whether this be so or not, there is reason to believe that the cultivated form has existed in India for a period not far short of three thousand years. The juice is contained

in the seed-vessel, the wall of which is scratched so as to allow it to exude. It then hardens, and is picked off. Opium is chiefly used as a stimulant or narcotic, and is either swallowed in small quantities or smoked (by itself or in prepared mixtures), or taken in the form of certain preparations made from it. Of these the most important are laudanum, which is made by soaking opium in spirits of wine, and solutions of morphia, which is the narcotic principle of opium.

387. It is **in India** that opium is chiefly grown as an article of foreign commerce, and in British India its cultivation is a monopoly of the government, which once derived from this article in one way or another an annual revenue of about ten millions sterling. The two districts in which it is grown are, the valley of the Ganges, round Patna and Benares, and a fertile table-land further west, corresponding to the old kingdom of Malwa, still chiefly under native chiefs, both lying between about 24° and 26° N. The former district is under British rule, and there the government makes annual contracts with those who are willing to cultivate it, these contracts always obliging the growers to sell the whole crop to the government at a fixed rate, according to quality. Opium grown in the native states pays a large duty on crossing the British frontier. The principal market for the opium was China.[1]

388. Outside of China and India, opium is chiefly consumed in Mohammedan countries, where it has come into pretty general use as a substitute for wine and spirituous liquors. Persia and Asia Minor are hence the principal countries of western Asia in which this drug is cultivated, and in both it forms an article of export. The export of Asia Minor is next in quantity to that of India, and in quality the product of this region surpasses that of any other part of the world. In the countries of western Europe opium is chiefly used in medicine, and the English supply is mainly derived from Asia Minor (Smyrna). In the United States many of the people of European origin are said to have learned from the Chinese immigrants the practice of using opium as a stimulant.

389. TEA is the name given to the dried leaves of one or more shrubs or trees allied to the camellia. The agreeable stimulant to which tea owes its value in commerce is, chemically, almost identical with that found in the two commodities next considered, coffee and cocoa. These three commodities likewise agree in requiring for their cultivation at least warm summers with frequent rains, although they differ greatly in the degree of cold they will stand. They also agree in requiring more or less cheap labour to prepare them for the market, and this necessity in many cases excludes them from regions

[1] Towards the end of 1906 edicts were issued by the Government of China having for their object the suppression of the use and cultivation of opium in that country within ten years, and in 1911 the Government of India agreed to bring the export entirely to an end in 1917 or earlier, if proof was given of the absence of native grown opium in China.

where the climate is quite suitable. Lastly, they agree in being derived from trees which take a certain number of years to come into profitable bearing, and this circumstance would appear to have some effect on the fluctuations of prices of these commodities, and hence indirectly on their geographical distribution. The fluctuations in price are very striking in the case of coffee. In 1854, the first year for which we have records of average import prices for the United Kingdom, the average import price of coffee was £2 6*s*. 5*d*. per cwt. The price gradually rose with minor fluctuations to £3 9*s*. 7*d*. in 1863, then similarly fell to £3 0*s*. 8*d*. in 1870, rose again to £5 0*s*. 3*d*. in 1874, fell to £3 19*s*. in 1885, and then rose to another maximum of £4 9*s*. 9*d*. in 1896. No doubt several causes have contributed to these fluctuations, but it may be suspected that one cause is to be found in the long period of waiting for returns. High prices are likely to stimulate the laying out of coffee plantations in all parts of the world that meet the requirements of climate and labour. When these plantations come into bearing there is likely to be an over-supply, leading to a fall of prices that tends to throw out of cultivation the plantations in those parts of the world that are least favourably situated. Somewhat similar fluctuations are observable in the case of cacao prices. They are not so, however, in the price of tea, the price of which fell almost uninterruptedly from 1865 to 1904. But here we have to note another geographical effect. During the period of falling prices the area under tea has been steadily expanding in India, and latterly also in Ceylon, but the increasing production of these two parts of the world has evidently told severely on China, which has not adopted modern methods of transport, and only quite recently and to a very limited extent has introduced modern machinery for preparing the leaf. The Chinese export of tea both by sea and land amounted in 1881 to about 300 million lbs. Before the end of the nineteenth century it had sunk to less than 215 million lbs.[1]

390. The tea-plant comes into full bearing in the fifth year. It generally grows to the height of from three to eight feet, but sometimes much higher. One variety, which grows wild in Assam, and is by some regarded as the stock from which all other tea-plants are derived, attains the dimensions of a large tree. The name of the

[1] Considering the extensive consumption of all these products one may well be struck at the comparatively small total quantities of them entering into the commerce of the world, and still more at the comparatively small areas required for their production. The bulkiest and that requiring the greatest extent of ground is coffee, the total amount of which annually produced is believed to be not much more than 1,000,000 tons, which may be compared with the 4½ to 5 million tons of wheat and flour annually imported into the United Kingdom. J. C. Willis in his *Agriculture in the Tropics* (Cambridge, 1914), p. 66, estimates the total acreage under coffee at about 5,000,000 acres or about 7,800 square miles, an area not much greater than that of Wales. For 1911 the acreage under cacao, producing in all about 240,000 tons, is estimated by the same authority (p. 69) at 1,800,000 acres or about 2,800 square miles, less than one-thirteenth more than the area of Lincolnshire.

plant and its product is Chinese, which is due to the fact that it was in China that the plant was first cultivated, and that Europeans first became acquainted with it. Even in China the plant is said to have been unknown till the middle of the fourth century of the Christian era, and it did not come into general use in that country till four or five centuries later. The first European who is known to have mentioned it is the traveller Pinto, who visited Canton in 1544. As late as 1664, the English East India Company, when it wished to make a present of some tea to the King of England, had to buy a small quantity for the purpose from the Dutch, and when it was first imported into England, in the year following (1665), it was sold at the rate of £3 per lb.

391. Tea is one of the hardiest of all sub-tropical plants. Severe frosts, such as it is exposed to in northern China (**56**), check its growth and diminish its yield, but do not kill it. The plant is hence suited for a wide range of climate, but the climate best adapted for it is that which is warm, moist, and equable throughout the year. Like the cotton-plant the tea-shrub requires regular supplies of moisture during the summer months, but is easily injured by an excess of moisture settling about its roots ; so that the ground on which it is grown ought to have good drainage. All these conditions are best obtained on the slopes of mountains within the tropics or in sub-tropical regions, and it is in such situations that tea is chiefly grown up to an elevation which varies with the latitude.

392. The soil best suited to the tea-plant is said to be virgin forest soil, a light, rich, friable loam containing a good supply of vegetable mould or humus, or of organic matter in some other form ; and such soils are also most readily obtained in the situation just described. The presence of iron either in the soil or subsoil is believed to be always desirable, and hence reddish soils are preferred to others which are equally suitable in other respects. It is noteworthy that, unlike cotton (**358, 362**), tea is chiefly grown, in the principal countries of its production, on soils that are remarkably poor in lime.

393. But the successful cultivation of the tea-plant depends not merely upon soil and climate. In its preparation for the market tea demands a good deal of hand-treatment, so that it can be profitably grown as a marketable commodity only in those parts of the world which, besides having the other conditions suitable, have a plentiful supply of cheap labour. It is for this reason that China, India, Ceylon, and Japan are still the principal countries of its production.

394. In China the first crop of leaves is gathered from it at the end of the third year, but care is taken not to exhaust the plant by stripping it too closely. Thrice in the year the leaves are picked—in the third, fifth, and eighth month. The best leaves are the young ones, and as the youngest are first picked, the earliest gathering is the best. Women and children are mainly employed in this work.

Having been first dried in the sun, the leaves are then trodden out by naked-footed labourers, in order to break the fibres and extract the moisture. This done, they are heaped up and allowed to heat for some hours, until they have become a reddish-brown colour. They are next rolled up by the hand, and are afterwards again exposed to the sun should the weather be propitious ; but if not, they are slowly baked over charcoal fires. The object of the rolling is to mass the leaf in a state conducive to rapid fermentation, which is brought about by exposure of the leaf to a temperature of 104° F. for about an hour, and has the effect of reducing the proportion of tannin in the leaf from ten or twelve to about five per cent. The fermentation is finally stopped by drying in the sun or by baking over charcoal fires. With this process the preparation of the leaves in the form in which 'black tea' is mostly sent to the market is complete, and they pass from the hands of the growers to those of the native merchants. By these purchasers they are carefully sifted, the leaves of different sizes and ages are separated, and the stems and damaged leaves are removed. In the preparation of 'green tea' there is no fermenting process, but the leaves are merely roasted in an iron pan while being stirred with a stick, and then rolled a little, these operations being repeated several times in succession and the tea finally dried off. Rolling machinery is very little used in China, but the severe competition brought about by the development of tea cultivation in India and Ceylon has at last (since about 1898) led to its introduction.

Tea is also prepared in China in the form of bricks and tablets for convenience of land transport by porters or pack-animals. The ordinary brick-tea is made only of the refuse of the tea prepared by ordinary methods—inferior tea-leaves, stalks, and tea-dust. But of late years the finest tea-dust has been compressed by steam machinery into tablets of tea of excellent quality, which are exported to Russia. A kind of tea known as 'flat tea' is prepared in Japan from unrolled leaves picked from bushes that have been partly blanched by being grown in the dark for two or three weeks before picking.

395. The introduction of tea-cultivation into India was due to government incentive. Experimental plantations were started by the Indian government on the hills of Assam, and at different points on the southern slopes of the Himalayas, between 1834 and 1849, and a grant of land was made by the government to the first private tea-company formed in India, in 1839. It is only since 1851, however, that tea-planting in India has been a marked success.

396. The single province of Assam contains more than half the total area of Indian tea-plantations, but tea is also extensively grown at various points on the Himalayan slopes, in Bengal, the United Provinces, and even in the Punjab, and also on the Nīlgiri Hills in southern India, and to a very small extent in Lower Burma. In northern India the limit in height of profitable cultivation is mostly

about 3,500 feet above sea-level, but on the Nīlgiris the best elevation is from 4,800 to about 5,600 feet.

397. There are three main varieties cultivated in India—the Chinese plant, which yields a comparatively weak tea, and furnishes a small yield; the native tea of Assam; and a cross between the two, which last is most in demand among the planters. The method of cultivating and preparing tea in India is much the same as in China, except that the bushes while bearing (that is, during the southern monsoon, March to November—**1047**) are picked about once every ten days, and that the rolling is performed by machinery. The average yield of an acre under tea in India varies in different localities from about 100 to above 400 lbs. per acre, and statistical returns on this head would seem to betoken an improvement in the methods of cultivation. In 1882 the average for the whole of India was under 300 lbs. per acre, but in 1910 it was above 450 lbs. These figures, however, are for the whole area under tea, inclusive of immature plants. In the principal tea-growing province, Assam, the average yield of the gardens containing mature plants was 500 lbs. per acre.

398. About 1880 the cultivation of tea in Ceylon began to extend with extraordinary rapidity in consequence of the failure of the coffee-plantations (**410**). The soil and climate have been found to be admirably suited to the shrub, which has yielded in some localities as much as 1,000 lbs. an acre; and the cheap coolie labour, no longer required on abandoned coffee-plantations, affords the means of preparing the product for the market at the smallest possible cost. Leaf-rolling machinery here, also, is in general use. The rapid growth of tea-production in Ceylon is shown by the fact that the export increased uninterruptedly from 1·67 to 148·6 millions of lbs. in the last eighteen years of the nineteneth century.[1] The year 1883 was the first in which the export exceeded one million lbs.

399. Into Japan and Korea the cultivation of the tea-plant is said to have been introduced early in the ninth century A.D., and the former country has now an export trade in this article which ranks next in quantity and value after that of India and Ceylon. Japan tea is mostly prepared as green leaf (the leaf being simply steamed, rolled and fire-dried). Almost the whole of this export is taken by the United States.

400. The cultivation of tea has likewise been tried with more or less success in Java, the United States, Brazil, Trans-Caucasia, Jamaica, Natal, and Madagascar. The first plantation on Java was formed in 1827, and after that date the area under cultivation extended considerably, but of late years it has shown a tendency to decline. The high price of labour in the United States generally makes tea unfit for

[1] The first year in which there was a diminution of the Ceylon export of tea was 1901. The industry was then somewhat depressed even in India and Ceylon, but the condition of the industry has since improved, partly in consequence of the increasing use of tea on the mainland of Europe. The consumption in India, so far as it has been estimated, was calculated in 1906 at only ·033 lb. per head.

cultivation as a marketable commodity, though it is grown for home use on a small scale on many of the farms in the southern states, and in California. Promising experiments on a commercial basis but on a small scale have been made at Summerville, near Charleston, South Carolina. Tea of excellent quality has been grown among the German colonies of southern Brazil, but, so far, this is little more than an experiment. The experiments that have been made in tea-cultivation on the western seaboard of Trans-Caucasia have been quite satisfactory as regards the suitability of the climate. A beginning was made about 1890 with the laying-out of tea-plantations for commercial purposes, and the industry is now established, though on a small scale.

401. Outside of Asia, people of English and Russian race are by far the greatest consumers of tea. Of the total amount exported from all countries in one year, the United Kingdom takes more than one-third, Russia less than one-fourth, America (chiefly the United States and Canada) about one-fifth, and Australia and New Zealand one-eighteenth. The rate of consumption per head of population in the United Kingdom is about 6½ lbs. a year; and this proportion is even exceeded among the people of Australia and New Zealand. The Dutch, who were the first to introduce tea into Europe, still consume a considerable amount relatively to population, and so also do the Belgians; but in other European countries outside of Russia the consumption is insignificant.

COMMODITIES (*continued*)

C. Tropical Products

402. COFFEE. The coffee of commerce consists of the seeds (the so-called '**beans**') of several species of trees or shrubs, chiefly of one species known to botanists as *Coffea arabica*, Linn., which if left to itself grows to the height of twenty-five or thirty feet, but in cultivation is frequently kept down to the height of from three to eight feet in order to facilitate the gathering of the fruit. The seeds are enclosed in dark cherry-red pulpy berries, each of which usually contains two. The tree comes into full bearing in six years, and remains profitable for from thirty to forty years, after which the soil is worn out. The **best soil** for the coffee-tree, as in the case of tea, is said to be virgin forest land rich in vegetable remains, the accumulations of past ages. A warm and moist climate is required for it, but the heat must not be excessive. An almost ideal climate for coffee is found in Yemen (**1031**), the home of the original Mocha coffee. Here, winter and summer alike, a thick mist ascends every morning from the low grounds on the coast to the slopes on which the coffee is grown. About midday the plantations themselves become enveloped in mist, which lasts till after the time at which the greatest heat of the day is usually experienced elsewhere, and then disappears. So regular is this occurrence that in certain places there are scarcely twenty days in the year on which the mist fails to rise. By night, on the other hand, the air ascending from the hot plains helps to prevent an excessive lowering of the temperature, so that we have as it were a 'hothouse culture with natural self-regulating arrangements.'[1]

403. For the most part coffee-trees, at least when young, must be cultivated either **under cover or under the shelter of trees better fitted to stand extreme heat.** Bananas and erythrinas are frequently grown for this purpose, and in Brazil a tall, coarse pea, which enriches the ground with valuable manure when it dies down, is often planted with the same view. On the other hand, the coffee-tree **cannot stand continued frost**; and though it has to endure occasional frosts in Paraguay, in most coffee-growing countries the mean temperature of the coldest month is above 52° F., and the mean minimum temperature about 42½°. On this account, its range in latitude is more contracted than that of tea (**391**). Coffee, indeed, is not grown to any great extent outside of the tropics, although the most important place of production, the coffee-region of Brazil, lies just beside the outer limit of the torrid zone.

[1] Eduard Glaser, in *Petermanns Mitteilungen*, 1886, p. 34.

404. Even within the torrid zone, the cultivation of coffee is generally restricted to comparatively limited areas[1]; the reason of which is that coffee is a product grown almost solely as a mercantile commodity, that is, for consumption outside of the regions in which it is produced, and, at the same time, is one that demands a large amount of **labour** in preparing it for the market.

405. The preparation which the coffee-beans have to undergo before they are ready for the market consists in their separation from their coverings and the processes of drying and 'curing.' In making the finest kinds of coffee the berries are, first of all, **pulped,** or stripped of the outer pulpy covering, in a machine specially devised for the purpose. The **curing** process which then follows consists in exposing the beans to the sun for six or eight days; and as the beans after being pulped are extremely sensitive to injury from rain or dew, great care must be taken during this stage to protect them from these influences. When cured the beans are, in most coffee districts, sent to coffee-works erected in the larger towns or the seaports to be **hulled** or **peeled**—that is, divested of two coats in which each of the beans after pulping is still wrapped. Before being put into bags for shipment the beans are winnowed, graded, and sorted, the sorting being not only according to quality but also according to size, since beans of the same size can be more equally roasted before being ground.

406. The use of coffee as a beverage appears to have been very limited till within the last two or three hundred years. The oldest work known to have collected traditions regarding the origin of the practice is an Arabic manuscript belonging to the year 1587; and from this it would appear that the original home of the coffee-tree is to be found in the southern parts of the highlands of Abyssinia, where it is undoubtedly a native. Thence it was introduced into south-western Arabia, and through the Arabs it became known to Europeans. It is to this fact that the tree owes its specific name of *arabica*, while the generic name, and the ordinary name of the plant and its product, is derived from that which was given to it by the Arabs, and this again is possibly derived from Kaffa, the name of one of the highland districts of Abyssinia whence the tree was originally brought. The introduction of coffee into Arabia must have taken place at least as early as the eleventh century, but even in the middle of the sixteenth century the beverage was still unknown at Constantinople. About a century later still (in 1652) the first coffee-houses were started in London, and these soon became favourite resorts of the wits and men of letters of the time; but in England the drinking of coffee was gradually given up to a large extent in favour of tea, which was introduced even more recently (**390**). On the mainland of Europe, on the other hand, coffee has come more and more into favour, especially among the nations of Teutonic race; and it is also largely consumed among the people of the

[1] See note to par. **389**.

United States. Relatively to population, the largest consumption of all is in Holland, which is a natural consequence of the extensive commerce between the home-country and its coffee-growing possessions in the East. In that country the total consumption of coffee has amounted in recent years to nearly 15 lbs. per head; in Belgium it is about 13 lbs.; in Sweden 12; in the United States 11; in Germany 7; in France less than 6; and in the United Kingdom less than 1 lb. per head. The total consumption of coffee all the world over is still rapidly increasing.

407. The following table shows the proportion of this total furnished by the principal coffee-producing countries :—

———	Per cent. of total export			Per cent. of total production, 1884–88[1]	
	1852–62	1862–72	1872–82		
Brazil . . .	52·0	47·4	50·8	Brazil . .	63·1
Java . . .	20·1	16·7	14·3	Dutch E. Indies	10·3
Ceylon . . .	8·7	12·4	7·5	Central America	8·0
Hayti . . .	4·0	4·0	5·4	San Domingo .	4·2
Venezuela . .	3·9	3·9	5·2	Venezuela .	3·3
British India . .	1·7	4·2	3·6	Porto Rico .	2·5
Sumatra and Celebes	3·6	3·6	3·0	British India .	2·0
	94·0	92·2	89·8		93·4

408. Brazil, which now, as the table shows, ranks first, gained importance on account of its coffee-production only in the nineteenth century. The tree was introduced into northern Brazil early in the eighteenth century, but not till about fifty years later into the region where it has since flourished so well. The coffee-producing region in Brazil lies between about 21° and 24° S., and is divided into two zones, one of which is traversed by a system of railways connected with Rio de Janeiro, and the other with a system connected more directly with the more southerly seaport of Santos. It is the latter in which this culture is most rapidly extending (83). The height at which the tree is grown is, in general, from about 600 to 2,500 feet above sea-level. The quantity of production or export is usually given in bags each equal to 60 kilos. (132 lbs.).

409. The introduction of the coffee-tree into Java dates from 1650, when it was carried by the Dutch from Arabia. There plantations are generally at the height of from 2,000 to 4,000 feet above sea-level.

[1] Since this date the proportion furnished by Brazil has been steadily increasing, amounting in the early years of the war to more than 70 per cent., and the production in Venezuela, Colombia, and Central America was growing more rapidly than that of Java. In 1917 the area under coffee in Brazil had grown to about $4\frac{1}{2}$ million acres, and an additional million acres in the State of Parana was said to be nearing the exporting stage.

Formerly about two-thirds of the coffee grown in Java was grown on government plantations, but of late years the production of the private plantations has been pretty steadily and rapidly advancing.

410. In Ceylon, the cultivation of coffee (which was introduced into the island when it was in Dutch hands, in the seventeenth century), after rapidly extending during many years, has rapidly declined since about 1880. This is partly due to the fact that during the prosperous period for coffee-growers plantations had been established too rashly, and in many cases in unsuitable situations, but chiefly to the ravages of insect and fungi (**125**). Most of the coffee-plantations have consequently been abandoned in favour of tea and other cultures.[1]

411. The figures in the table in par. **407** show a more satisfactory state of things in India. The cultivation of coffee is said to have been introduced into that country about two centuries ago, by a native Mohammedan on his return from a pilgrimage to Mecca; but it is only since about 1840 that it has spread with any great rapidity. It is now increasing every year, principally among the virgin forests on the eastern, and therefore more sheltered, slopes (**1047**) of the Western Ghāts, to the south of about 15° N. The most desirable elevation on these mountains is from 2,500 to 3,500 feet above sea-level. The tree is also cultivated on much lower ground further east, but it is nowhere grown with success in northern India.

412. Among the minor areas of coffee-production, those which have shown the greatest increase since the middle of the nineteenth century, are Mexico and Central America (more particularly Costa Rica and Guatemala). In point of quality no coffee surpasses that of the district of Alta Vera Paz, northern Guatemala, where the cultivation is carried on with peculiar care. The African export is likewise rapidly increasing; and here it may be mentioned that the State of Liberia gives name to a species of coffee (*C. liberica*, Hiern.) which is valuable from the fact of its being suitable to unsheltered low grounds even in equatorial regions,[2] and being not so readily attacked by the fungus which has ravaged the plantations of Ceylon. It has, for that reason, been introduced into Ceylon and other coffee-growing countries. Egypt, which, when coffee was first introduced into Europe, was one of the principal sources of supply, now furnishes coffee no longer; and the Arabian export is relatively small. Jamaica, Colombia, Surinam, the Philippine Islands, Nyasaland and other parts of Africa all produce more or less coffee, which can also be grown on the eastern slopes of the highlands of Queensland. See also **1084**.

[1] In 1898 the extent of the coffee-plantations of Ceylon was less than 9,000 acres, against about 270,000 acres in 1897. The export declined from 100 million lbs. in 1877 to 11 millions in 1900.

[2] Liberian coffee can stand temperatures of over 104° F., whereas the highest temperatures to which the Arabian coffee can be exposed with safety are from 87° to 94° F.

413. CACAO. Cacao, or cocoa, as it is more frequently but rather unfortunately called, is the product of an American tree *Theobroma cacao*, L., not to be confounded with the coco-nut palm (**444**, **462**) or the coca shrub (**475**). The tree comes into full bearing in twelve years (in favoured regions earlier) and continues to yield good returns for about thirty years, after which the yield begins to decline. The form in which it enters into commerce is that of cacao-beans or chocolate nuts, which are the seeds contained, to the number of thirty to fifty, in a red or green fleshy fruit from six to ten inches in length. These beans or seeds, which form an important article of diet among the natives of tropical America, are composed to the amount of half their weight of a fat known as cacao-butter, which has the valuable property of never becoming rancid, however long it is kept. The extraction of this fat has become a considerable industry in Germany. Being rather difficult of digestion, however, this fat is generally removed, as far as possible, in preparing the well-known cacao-powder or cakes of chocolate. Among the constituents that remain are flesh-forming compounds, on account of which cacao is highly esteemed for its nutritiousness.

414. Before entering into commerce the cacao-beans have, like those of coffee, to undergo a preliminary treatment, and the quality of the article depends greatly on the care bestowed on the necessary processes, the price of well-prepared beans being often more than double that of beans prepared in a more slovenly fashion. The first process is one for setting up fermentation, which removes a disagreeable bitter flavour, destroys the power of germination in the seeds, and prevents mustiness. The best cacao-beans are fermented for a period of five or seven days, by placing them in a heap along with plantain or other green leaves—a process during which so much heat is developed that the hand cannot be held in the heap for an instant. Afterwards the beans are dried in the sun, so as to reduce the cost of carriage (**205**), and they are then ready for shipment. When roasted and split, or broken, these beans form the 'cocoa-nibs' of the shops.

415. The cacao-tree must be grown where there is little or no wind, which would break the heavy seed-vessels. It succeeds best under a higher temperature than coffee, and requires a great deal of moisture and a considerable depth of soil—much greater than that necessary for sugar. It therefore generally grows nearer the equator than coffee, and mostly on low grounds. Yet it as well as coffee is liable to suffer from direct exposure to the rays of the sun, and is hence mostly grown under the shade of other trees (**450**). The principal producing areas, in the Gold Coast (**1200**), Brazil, Ecuador, the island of São Thome, and Trinidad, as well as Venezuela, Ceylon, and Java, are all within thirteen degrees of the equator. Cacao is, however, also grown in Mexico, not far from the tropic of Cancer, largely in San Domingo, and to a small extent also in the island of Cuba.[1]

[1] See note to par. **389**.

416. Cacao became known in Europe early in the sixteenth century, and hence before either tea or coffee; but **Spain**, where it first became known and acquired favour, is the only European country in which it is preferred to all similar beverages. There it is regarded **almost** as a **necessary of life**, as tea is with us. Switzerland is now, however, the country that has the largest consumption per head, without doubt in consequence of the great development of the chocolate industry in that country in recent years.

417. RICE. Rice is the characteristic grain-crop of the plains in the monsoon area of the tropical and sub-tropical parts of south-eastern Asia (**64**). There are many varieties of this crop, some of which require very different conditions from others; but those which are most abundantly produced not only demand a high summer temperature, but have to be grown in fields capable of being flooded at certain stages of their growth; and it is these conditions which are afforded in the great river deltas and low-lying seaboard tracts subject to inundation during the summer rains of the area referred to. The fields in which the rice is grown are embanked to retain the water as long as may be needed, and where not sufficiently level by nature are carefully levelled by art; and if the rains or the overflow of rivers are not sufficient to inundate the fields, the necessary water must be furnished by irrigation. The amount of flooding required or capable of being endured varies at different stages of growth. 'While the seedlings are in an early stage of growth, two inches of water are ample; but when the stem is strong, high floods are almost unable to drown it.'[1] During flooding growth is astonishingly rapid, as much as nine inches having been known to be added to the height of the stalk in twenty-four hours.

Of the numerous varieties of rice some ripen at one period and others at another, so that it is said to be possible for the owner of an estate in Bengal, with a mixture of soils suited to different varieties, to have as many as five crops in the year. Two rice-harvests in the year are almost universally obtained in Bengal, and frequently two crops are taken from the same field.

418. From the highly peculiar conditions under which rice grows, it follows that where grown at all it is grown to the exclusion of almost every other crop; and outside of the regions above indicated, where the surface and climate are specially adapted to this form of agriculture, the cultivation of rice is for the most part locally restricted to small areas presenting exceptional facilities for artificial inundation. There are, indeed, certain varieties of rice, known as upland or **hill rice**, which thrive on a drier soil, in India even at an altitude of 8,000 feet; but these varieties occupy only comparatively small areas.

419. Yet, notwithstanding this local restriction of the rice-crop, it is probable that no other grain forms the staple food of so large a part

[1] Hunter's *Gazetteer of India*, 2nd ed. vol. vi., p. 485.

of the human race. No tropical grain yields so large an amount of food from a given area of land; and hence the lowlands of Asia adapted to this crop are the most densely peopled parts of that continent. Nevertheless, the statements made as to the number of people living chiefly or almost entirely on rice are mostly exaggerated. Sometimes it is asserted that these make up fully one-half, more commonly about one-third, of the human race; but the probability is that even the lower of these estimates is much too high. (See also **70** for a correction of the exaggeration of former editions as to the yield of this crop per acre.)

420. Japan, the Philippine Islands, the Sunda Islands, and Indo-China are probably the regions in which the great bulk of the entire population live mainly on rice. In India and China there are certain regions, and these in many cases the most populous, where rice is likewise the mainstay of the inhabitants. Still it is estimated that, if we take British India as a whole, only about one-third of the population is rice-eating, and, since the native states lie mainly outside of the regions suitable for rice-cultivation, it may safely be inferred that a much smaller proportion of the inhabitants of these states live on rice.

421. Relatively to this vast consumption, rice does not enter very largely into the commerce of the world. The great countries of Asia for the most part supply their own wants as regards this commodity within their own borders, and the trade in rice is hence principally a home trade. The density of population in most of the great rice-producing regions of the world does not allow of any great surplus for the commerce with Europe and America, and the supplies for these parts of the world are mainly obtained from one comparatively small district, Burma, which is the least densely populated of all the great rice-growing regions of the world. Of the total export of rice from British India, between 60 and 70 per cent. is from Burma, although the rice-fields there cover only about one-sixth of the area of those of Bengal. Cochin-China and Siam are the only other countries that furnish any considerable supply to Europe. Rice is grown here and there in southern Europe, above all in Italy (Piedmont, Lombardy, and Venetia), so that rice is among the principal Italian exports of home production. It is also cultivated in the United States (**1297**).

422. MILLETS. This name is given to several grain-crops, the most important of which are tropical. The two kinds most largely grown are the Great Millet (*Sorghum vulgare*, Pers.) and the Spiked Millet (*Pennisetum typhoideum*, Rich.). They are both among the leading crops of India. Great Millet is also largely grown in Africa under the name of durrah. It is sometimes known as Guinea corn. Neither product enters largely into the commerce of the world. A species of sorghum is pretty largely cultivated in the United States and elsewhere for green fodder. The so-called millets, including that of the temperate zone, *Setaria italica*, Beauv., agree only in yielding grain of a small size. (See also **433**.)

423. MINOR FARINACEOUS PRODUCTS. Tapioca is derived from the long tubers of the manioc plant (*Jatropha Manihot*, L.), a native of Brazil, but now

largely cultivated elsewhere in the tropics of the Old World as well as the New. The tubers, before being subjected to heat and pressure, are highly poisonous, but the meal, a granular substance derived from them, and known as tapioca or cassava, according as it results from slightly different modes of treatment, is wholesome and nutritious. This meal forms a staple article of food among the people of Brazil, but it is imported into this country chiefly from the West Indies, and from the East Indies by way of Singapore. **Sago** is obtained from the pith of palms of the genus Sagus, principally *S. Rumphii*, Wild., and *S. laevis*, Reinw., largely cultivated in the eastern half of the Eastern Archipelago, including Borneo, whence it is imported by way of Singapore in sacks made out of the leaves of the palm itself. So easy is the cultivation of the palm, a single family is able to attend to a plantation containing 400 trees (**70**). West Indian sago is the produce of cycads. **Arrow-root** is derived from various sources. That which is distinguished as the true arrow-root is obtained from the rhizome of *Maranta arundinacea*, L., a native of tropical America, but now cultivated also in the Old World. This arrow-root is chiefly obtained from Jamaica and the Bermudas. Other kinds are derived from India and elsewhere.

424. SUGAR-CANE. The sugar-cane belongs botanically, like the cereals, to the family of the grasses, but its seed or grain is commercially of no value, and the plant is cultivated solely for the sake of the juice which is found in its stem, and which yields sugar. It is a tall plant, growing to the height of from ten to fifteen feet, and some of the stalks attain a thickness of more than an inch. Every year these stalks are cut down just before flowering, but the root-stock is perennial, and continues to throw up fresh shoots every year in sufficient quantity to be remunerative for thirty years in succession. This is one advantage which it has over its great modern rival, sugar-beet (**302**), and it likewise surpasses this latter sugar-plant in the ease with which it can be grown, and in the relative amount of sugary juice afforded by a given weight of raw material, as well as in the relative amount of sugar capable of being derived from the juice. In cultivation the sugar-cane requires hardly any attention, and an acre of ground under this plant is calculated to yield on an average not far short of twice as much juice as one under beet (**70**). The range of the sugar-cane in latitude is wider than that of coffee, but not so wide as that of tea. In the northern hemisphere it is grown successfully to the north of lat. 37° in the south of Spain, and in the southern hemisphere, in Natal and New South Wales, to about lat. 30° S. A moist soil being required for sugar-cane, the situation in which it is grown is very different from that of tea or coffee, and more like that adapted for rice, the cultivation of which has in many cases given place to sugar.

425. Originally a product of eastern Asia (probably of Indo-China and the valley of the Ganges), the sugar-cane became generally known in the west only in comparatively recent times. The cane itself, and the knowledge of the mode of extracting sugar from it, would appear to have been introduced by the Arabs first into Egypt, and then, in the ninth century, into Crete, Sicily, and other islands of the Mediterranean. Subsequently it was introduced into Spain, which is now the

only part of Europe where, under the protection of the government, it still flourishes. At the present day the cultivation of the cane is spread over all tropical and many sub-tropical countries, including the islands of the Pacific, and the chief area of production, so far at least as the commerce of the world is concerned, is now in America (the West Indies, Guiana, and Brazil). By far the largest producer is now Cuba, where since the liberation of the island from Spain the production has increased eight-fold.[1] In India the total production for native use (unrefined) is very large, but not equal to the home demand, and the production per acre is smaller than that of any of the great producers. In the Old World, Java, the Philippine Islands, China, Japan (Formosa), Mauritius, and Egypt are the chief exporters of cane-sugar.

426. THE SUGAR INDUSTRY. Sugar, now the cheapest of all luxuries, and, indeed, regarded as a necessary of life by the very poorest in almost all parts of the world (**8**), was a substance unknown to the classical nations of antiquity. There could be no more signal illustration of the results of the development of commerce and the stimulation of agricultural and mechanical industry due to commerce. Even about four hundred years ago refined sugar, in the form of the white crystalline substance with which we are familiar on our tables, was still an unknown article. The invention of the process of refining sugar into the form known as loaf-sugar is ascribed to a Venetian about the end of the fifteenth or beginning of the sixteenth century. As late as the beginning of the eighteenth century sugar was still a comparative rarity in Europe. At that date the total amount consumed on the continent in one year is estimated to have reached only about 50,000 tons. Now the amount annually consumed in the United Kingdom alone is more than thirty times as much. Apart from some kinds of timber, cane-sugar is, next to rice, the bulkiest of tropical commodities in proportion to its value, and demands a great amount of shipping. It should be mentioned that the consumption just mentioned is exclusive of molasses as well as of **glucose**, a kind of sugar derived from the starch of maize or potatoes, and imported into this country chiefly from the United States, to be used as a sweetener in jam-making, in brewing, and for many other purposes.

427. The effect of this growing demand has been to bring to light new sources of supply, to improve the system of agriculture employed in producing the crops from which the new supplies are obtained, and, above all, to lead to the perfection of the processes by which the sugar is extracted from the plant. Down to the nineteenth century the sugar-cane was almost the sole source of supply of the sugar consumed in Europe. The presence of sugar in beet-root was discovered by a Berlin apothecary named Marggraf, as far back as 1747. Before the close of the same century another Berlin chemist, named Achard, devised a method of extracting the sugar from beet; but the first

[1] From half a million to over four million tons.

attempts to do this were not commercially successful. At a later date great improvements were introduced in the method of extraction by the French Comte de Chaptal, and after 1820 the making of beet-sugar became firmly established as a branch of national industry in various countries in Europe. Since then sugar-beet has become every year a more formidable rival to sugar-cane, and in considering the development of the sugar industry it will be instructive to compare the relative advantages of these two rivals.

428. On the side of sugar-cane there is the advantage of easy culture and relative richness in sugar (**424**), and likewise the fact that it is grown in tropical and sub-tropical climates where labour is at its cheapest. Beet suffers under the disadvantage of requiring high cultivation (more especially plentiful supplies of potash manure), of requiring to be re-planted year by year, of being less rich in sugar, and of being grown where labour is relatively dear, at least in comparison with the countries of the sugar-cane. On the other hand, beet has the advantage of being grown where population is dense, and where accordingly the market is close at hand both for the raw material used in the refineries and also for the manufactured product; where, too, in consequence of that density of population, manure is abundant, or the advanced state of commerce renders it easily procurable; and where the abundance of capital, and the consequently low rate of interest on money, favours the erection of the best machinery for dealing with the raw material. Moreover it has the further important advantage of yielding a refuse material of much higher value than that obtained from the sugar-cane. The canes after being deprived of their sugary juice are chiefly used for fuel; but the refuse beet, the beet-pulp, as it is called, besides being a useful manure, especially as returning potash to the ground, is a valuable food for cattle—a circumstance of special importance in thickly peopled countries. The mention of these conditions affecting the cultivation of sugar-beet enables one to understand why the plant cannot be cultivated with success in all parts of the world in which the climate is suitable. It is enough to point out that in the United States, for example, agricultural labour is relatively much dearer than in Europe, the interest on money in most of the regions in which beet could be grown is much higher, and cattle-food relatively of much less value. (See, however, **302**.)

429. It should be noted that the first disadvantage of beet, as a competitor with cane mentioned in the preceding paragraph, may be looked on from the point of view of agriculture generally as an advantage through tending to promote careful cultivation. There are other indirect advantages in connection with the sugar-beet industry. The extraction and refining of the sugar are conveniently complementary to the growing of the beet both as regards place and time. The amount of waste in the raw material makes it important to have the factories near the farms (**205**), all the more since that waste matter ceases to be

waste when returned to the farms. That favours the establishment of at least one manufacturing industry in country districts. At the last industrial or occupations census of Germany (1907) 40 per cent. of the refinery employees were in towns of less than 2,000 inhabitants, and an additional 33 per cent. in towns of 2,000 to 20,000. Then the factory work is confined to three months in the year, September to December, when agricultural work is slack, so that the agricultural industry can easily spare labour for the factories, all the more easily since the refinery labour is to agricultural only in the ratio of 2 : 13.

430. As affecting the competition between sugar-beet and sugar-cane at the present time, probably the most important factor in deciding on which side the general advantage lies is the superiority of the methods and machinery for extracting sugar from the beet. In the case of the sugar-cane, the stems of the plant are as a rule merely crushed between rollers which still leave in the cane a considerable proportion of the juice. The juice that is pressed out is boiled and otherwise treated, part of the substance then forming the crystals of sugar, while the remainder flows away in the form of a syrup known as molasses. From the country of production cane sugar is usually exported in an unrefined condition, in which it is called raw sugar, and the raw sugar is further treated and refined, more syrup flowing away during these further processes. In the case of sugar-beet, the roots containing the sugar are first treated in one of two ways, either of which extracts from their substance a larger proportion of the juice contained in them than is usually derived from the sugar-canes. One method is to subject them to the action of powerful presses; but a still better method is that known as the diffusion process, the invention of a German named Robert, but improved and first made practically useful in France (by Charles, and afterwards by Peret of Roye). According to this process slices of the beet-root are subjected to the action of hot water either in a number of different tanks or in one continuous cylinder, but in either case in such a manner that the water ultimately gets thoroughly saturated with juice. The after-treatment of the beet-juice differs in some respects from that of cane-juice, but is in the main similar. The general result of the improvements that have been brought about in the cultivation and treatment of sugar-beet in Germany, where this branch of industry is most highly developed, is such that whereas in 1836–37 18 cwts. of beet were required to produce 1 cwt. of raw sugar, only between 10 and 11 cwts. were about 1882 [1] needed for that purpose. A part, but only a small part, of this improvement is to be ascribed to the advance of agriculture increasing the proportion of sugar present in the beet. By far the greater part is due to the more complete extraction of the juice.

431. Till lately the cane-growers relied solely upon the greater richness of their raw material to enable them to compete with the

[1] Since reduced to from 7 to 8 cwts.

producers of beet-sugar. Down to the end of last century they were everywhere feeling the increasing severity of beet competition. In the commerce of the western world (Europe and North America) beet, according to the best estimates that could be found, had already overtaken the cane in 1885, and in 1900 the production of beet-sugar was estimated at nearly six as against less than three million tons of cane-sugar, excluding, however, the large but uncertain production of India and China. In order to meet beet competition the method of diffusion has been tried in some places (as in Java) with the cane. An obstacle to the employment of the process arises from the high price of coal in most cane-growing regions, but it may be suggested that in tropical countries the heat of the sun might by some method or other be employed to evaporate the water used in the diffusion process (**114**). An economy has been effected by a change of system in some cane-growing districts. Instead of each planter extracting the sugar from his own cane, different estates are connected with a single sugar-factory, the juice from the canes being pumped through pipes leading to reservoirs belonging to the factory. This is known as the *usine* or factory system. Even this method does not produce the most economical results unless the separate estates are large enough to be equipped with the best crushing machinery. Otherwise it is found best to convey the cane itself to the central factory to be crushed there.

432. Here it should be mentioned that there are few industries the pursuit of which has been more generally affected by government regulations. In all the chief beet-sugar producing countries of Europe special fiscal regulations have been made with a view of encouraging that industry.[1] In some cases a direct bounty has been granted on exports. In other cases a drawback on exports has been allowed at such a rate as to favour exportation of sugar. In all cases a protective customs duty has been imposed. As the law stood in France at the beginning of the twentieth century a small direct bounty was granted on exports, but the encouragement to the industry was given mainly in connection with the revenue raised on production. The tax on home-consumed sugar was 60 francs per 100 kilos., but the sugar manufacturer paid the full tax only on the assumption that nearly 13 cwts. of beet were required to produce 1 cwt. of raw sugar. For any production in excess of that rate the taxation was considerably reduced. Now, as can be seen from the note to par. **430**, the yield of sugar is in fact much above the proportion indicated. The law was thus effective in accomplishing its two main ends of increasing the production and quality of sugar-beets produced in France (mainly in the five northernmost departments) and the manufacture of sugar. In Germany and in Austria-Hungary at the same date direct bounties on the export of sugar were also granted, but these were likewise of small amount (at most under 2*s*. 6*d*. a cwt.), but a heavy protective import

[1] See a paper by M. Yves Guyot, *Jour. Statist. Soc.*, June 1902.

duty, amounting to twice the duty charged on the home consumption of sugar, enabled the manufacturers of raw sugar and the refiners in both countries to organise the industry in such a manner as practically to increase greatly the bounty on the industry. In Belgium and Russia bounties were paid on export indirectly. The consequence of such regulations was that in all the countries mentioned the production of beet-sugar was stimulated to a degree greatly in excess of that corresponding to the geographical conditions. The price of the sugar on the world-market was excessively lowered. A heavy burden rested on the sugar-consumers and tax-payers of the bounty-paying countries, and British consumers formed almost the sole large population that benefited. Hence, in this country there was a consumption of upwards of 80 lbs. of sugar per head, as against about 34 lbs. in Germany and only 17½ lbs. in Austria-Hungary. Repeated international efforts were consequently made to get rid of the system, and at last all the European countries concerned, except Russia, agreed to a convention for the abolition of the system. The convention came into force on the first of September 1903, and under it Great Britain, with the other parties to the convention, agreed to impose a special duty not less than the equivalent of any bounty on production on sugar imported from countries granting that bounty. It was agreed that no surtax or tax in excess of that levied on home-grown sugar should exceed 6 francs on 100 kilos. if refined, or 5 fr. 50 centimes on raw sugar imported should be imposed. All the parties to the treaty agreed to admit at the lowest tariff sugar from the contracting states. In 1908 Russia was admitted to the convention on agreeing not to authorise the exportation with return of or exemption from excise of quantities of sugar exceeding one million tons in the aggregate in the six years from September 1, 1907, to September 1, 1913. Among the apparent results of these agreements may be noted a marked increase in the consumption of sugar per head in Germany, an increase in the proportion of unrefined as compared with refined sugar imported into the United Kingdom, and in Russia a very rapid increase in the area under beet since 1908.[1] The agreements must also be regarded as a contributory influence in restoring the predominance of cane over beet in the sugar production of the world.[2] The United Kingdom withdrew from the convention

[1] The maximum consumption of sugar per head in Germany down to 1902–3 was about 30 lbs. On an average of the three years 1909–10 to 1911–12 it was about 40 lbs. Since 1903 the import of refined sugar into the United Kingdom has been practically stationary (down to 1913), while that of unrefined increased more than 60 per cent. There has been some but no great increase in the amount of sugar imported from the British West Indies. In Russia the area under sugar-beet increased from 556,000 hectares in 1908 to upwards of 750,000 in 1912. The production there in 1913–14 was above 15 million tons as against 26½ in Germany.

[2] In 1911–12 the production of cane-sugar was estimated at rather more than 9 million tons (including 2·39 in India) as against less than 7 million tons of beet-sugar. As to the effect of the great war on this competition, all that can be said at present is that the war threw out of cultivation most of the sugar-beet estates of central Europe, and the process of restoring them is bound to be slow.

in 1918, and subsequently approved the principle of granting a preference to empire grown sugar.

433. Besides the two great sugar-producing plants, sugar is obtained in greater or less quantity from various other sources. In the eastern parts of the Canadian Dominion and in the north-eastern states of the Union, sugar is largely obtained from a juice which flows out on tapping the trunk of various species of maple, and above all the sugar-maple (*Acer saccharinum*, Linn.). From this source is obtained a small proportion of the native grown sugar of the United States. In the same country a species of sorghum (**422**) is used in making sugar. It is grown for the purpose in more than thirty states, principally in the south and south-east.[1] Maize also has long been experimented on with a view of obtaining this article from its stem. In tropical countries sugar is largely obtained from various species of palms—in India from the Indian date-palm, the Palmyra palm, the coco-nut palm, and the sago-palm.

434. Relatively to population, the United Kingdom and the British Colonies in Australasia are by far the largest consumers of sugar. Next follows the United States; and Cuba, the Argentine Republic, and Brazil are all estimated to have a larger consumption of sugar per head than most of the States of Continental Europe.

435. CINCHONA. Cinchona is the name of a Linnæan genus of tropical trees, several species of which yield a bark invaluable in medicine. No other commodity enters so largely into the commerce of the world solely on account of its medicinal uses. For medicinal purposes the bark is made to yield extracts, the best known of which is quinine. Compounds from these extracts are also used. The medical uses are very various, but it is chiefly as affording a sovereign remedy for the malarial fevers incident to tropical climates that this bark is so highly prized. The species of Cinchona are all natives of the eastern slopes of the Andes, from about 7° N. to 22° S., occupying, generally in scattered groups, a belt of from about 3,000 to 10,000 feet above sea-level, a belt in which they are exposed to copious rains (**1344**), enjoy a tolerably constant temperature (**69**), and plenty of sunshine. The species most valued for their bark, among which are *Cinchona succirubra*, Pav., yielding the red bark of commerce, *C. calisaya*, Wedd., and *C. ledgeriana*, Moens, yielding the more valuable yellow bark, and *C. officinalis*, L., flourish best when grown within eight or ten degrees of the equator at the height of from 4,000 to 7,000 feet above sea-level, where the mean temperature is from about 55° to 70° F. In higher latitudes they are, of course, confined to a lower elevation.

436. The great value of this bark has led to numerous attempts to introduce the trees into other parts of the world than those to which

[1] The production therefrom in 1909 was more than one-fourth of the amount produced from sugar-cane grown in the same country.

they were originally confined, and some of these having been remarkably successful have caused great changes in the chief sources of supply, and within recent years have led to a great reduction in the price of the bark. Originally the region from which it was introduced into Europe belonged entirely to the domain of the old Empire of Peru, and subsequently to the Spanish viceroyalty of Peru ; and hence it became known by the name of Peruvian bark, which is still very frequently applied to it. After the establishment of the various South American republics, that of Colombia furnished the chief supply. The first attempts to introduce the tree into the tropical parts of Asia were made by the Dutch. The first tree was introduced into Java in 1852, and a few years later the cultivation of the cinchona was a successful government industry on that island, where it is now prosecuted by private individuals as well as by the government. To India the tree was brought direct from South America, by Mr. (afterwards Sir) Clements Markham in 1860. A government cinchona plantation was soon after established on the Nīlgiri Hills, and a second was afterwards set agoing in Darjīling, in lat. 27°, on one of the rainiest parts of the Himalayan range. These establishments, however, did not greatly affect the European supplies of the bark, since almost all their produce is used in India in the form of a cinchona febrifuge. Besides the government establishments, private plantations have been set up in India in the southern part of the Western Ghāts and on the mountains of Travancore.

437. But it was the Ceylon plantations which first greatly affected the international commerce in this drug and its price. Down to about 1880 Colombia remained the chief source of supply of this bark for the London market ; but so rapidly was cinchona cultivation extended in Ceylon that the British imports of the bark from that colony increased from 7,452 cwts. in 1881 to upwards of 115,000 cwts. in 1886. Since then the Colombian supply has dwindled to insignificance, but meanwhile Ceylon and India have been driven from their high place in the production of this commodity by the great success of the Dutch in Java and Sumatra.[1]

438. Among other parts of the world into which cinchona cultivation has been successfully introduced are Jamaica, where *C. officinalis* thrives admirably on the Blue Mountains, at the height of 5,000 feet and upwards, and Madeira, in about 33° N., the highest latitude at which its cultivation has yet proved a success. The *C. succirubra* succeeds on that island at an elevation of about 500 feet.

439. TROPICAL VEGETABLE FIBRES. Of these the most important (apart from cotton) is jute, which is derived from the bast chiefly of two species of a genus of plants known to botanists as *Corchorus*. These are slender-stemmed annuals, from about eight

[1] Above all in Java, which in recent years has produced more than eleven-twelfths of the world's supply.

to twelve feet high, cultivated in India, Ceylon, and China, to a less extent in some other tropical countries, as well as Syria and Egypt. In these last two countries the species known as *C. olitorius*, Linn., is cultivated chiefly as a vegetable. The cultivation of the plant on a great scale for the sake of the fibre is almost confined to the northern and eastern parts of Bengal. It is grown on every variety of soil, but by preference on the alluvial sand-banks thrown up by the rivers, for which situation it is peculiarly adapted by the fact that, except in the early stages of growth, it can stand heavy flooding without injury. The fibre, which is extracted from the stem by various processes, including that of retting (**305**), has long been woven into cloth called gunny-cloth by native hand-loom weavers, the cloth being chiefly used for making sacks and packing for cotton, coffee, and other products. Till about 1835 the use of this material in weaving was almost confined to India; but about that date it **began to be imported into Dundee,** where it has risen to be the chief article used in spinning and weaving, especially since the Crimean war (1854–56) temporarily reduced the Russian supplies of flax and hemp, on which the industry of that town to a large extent depended. For a time Dundee was the only seat of jute-factories, but the industry has since spread to other towns of the United Kingdom (especially to such as are also engaged in the linen industry), and still more recently the prosperity of the Dundee jute-manufactures has been a good deal checked by the establishment of factories on the Continent and in India itself. The Indian factories are almost all confined to Bengal, and indeed to the immediate neighbourhood of Calcutta, jute being the Bengal industry which rivals that of cotton in Bombay. Gunny-bags and other coarse packing-materials are still the chief product of the jute-factories. Hence the United States, which exports such enormous quantities of raw produce, takes about half the amount of jute manufactures exported from Great Britain, and Brazil and the Argentine Republic likewise import large quantities. Jute yarn, either alone or in combination with other yarns, is now also employed in the manufacture of various other fabrics, such as carpets, furniture-coverings, curtains, and even plushes and velvets. As it is capable, under proper treatment, of being made highly lustrous, like the flax fibre, it is particularly well suited for mixing with silk.

440. A rival to jute in the American market has sprung up since 1880 in the fibre known as henequen, or sisal hemp,[1] derived mainly from the thick fleshy leaves of the *Agave sisalana*, Perrine, a native of Yucatan, where it is now largely cultivated, partly also from other species of Agave, including the maguey (**1325**). Henequen has also been introduced into British Honduras and the West Indies. A rival to henequen for the making of twine, now its principal use, has appeared

[1] So called from Sisal, the port of export in Yucatan before the railway was laid from Merida to Progreso (see the map in the section on Mexico).

in the Argentine Republic, in the form of a fibre derived from the wax, carnauba or caranday palm (*Copernicia cerifera*), which grows in Entre Rios.

441. Next in importance to jute among tropical fibres in European commerce is Manila hemp, so called from the chief place of export (**1090**). It is obtained from the long leaves of *Musa textilis*, Nees, a tree belonging to the same genus as the banana and plantain (**445**), found wild on the Moluccas and Philippine Islands, and cultivated chiefly on the latter. Along with constant humidity and a high but fairly evenly distributed rainfall it requires a well-drained soil, and is hence often put out on steep mountain sides. The fibre is from six to nine feet in length, and is mainly separated from the leaf by the ill-paid hand-labour of the natives; but it is said that at least one reasonably good mechanical stripper has been invented, and that stripping-mills along the lower Agusan river, eastern Mindanao, would go far to revolutionise the industry.[1] Though more difficult to work and more brittle than hemp fibre, it is capable of being made into ropes of great tenacity and endurance, and it is very largely exported for that purpose. The finer fibres are woven by the natives of the Philippine Islands into delicate tissues, and in Europe they are likewise used (often in combination with silk) in making curtains, coverings for furniture, and other fabrics.

442. In Eastern countries (India, China, Japan, and the Eastern Archipelago) fibres derived from the bast chiefly of two varieties of *Bœhmeria nivea*, Hook., a species of plants belonging to the nettle family, have been used from the earliest times in spinning and weaving. The fibres, which are known in India as **rhea,** in the Malay Islands as **ramie,** and to Europeans by the name of China grass, are pre-eminent amongst vegetable fibres for strength, fineness, and lustre,[2] and produce an almost silky-looking fabric, called China cloth or grass cloth, which in China is very generally used for the making of summer clothing. Factories for the manufacture of this cloth have now been erected in various European countries, including the United Kingdom, and the plant is now cultivated with success in North Africa, southern and central Europe (in France, even in Normandy), and above all in Mexico.

443. Of all fibre plants China grass is that which seems likely to grow most rapidly in importance for weaving within the next few years. In some trials it proved to be more than twice as strong as Russian hemp, and, being not easily injured by moisture, it is well suited for the making of ropes. Its various qualities render it fit for being used in making, besides ships' cables, all sorts of woven fabrics, from the coarsest to the finest—sail-cloth, table-linen, 'alpaca,' velvet,

[1] Dean C. Worcester: *The Philippines Past and Present*, II, pp. 891–2.
[2] *Kew Bull.*, No. 18, p. 146.

and even lace and cambric. The chief obstacle to its use at present is its high price, arising from the difficulty with which the fibre is separated. A good machine for the extraction of this fibre was long a desideratum, but this is said at last to have been achieved, and to be now worked with success in Yorkshire.[1]

444. Of other tropical or sub-tropical fibre-plants it will be sufficient to enumerate some of the more important, since none of them has, so far at least, attained any considerable place in international commerce. A leguminous or pod-bearing plant, *Crotalaria juncea*, Linn., yields from its bast the **sunn-hemp** of India. In the same country the *Hibiscus cannabinus*, Linn., a member of the same family as the cotton plant, is largely cultivated, especially in the north, for its fibre, which is also obtained from the bast, and is known as **Deccani** or **gambo-hemp.** Several trees belonging to the same family furnish a soft silky wool, which, like the true cotton, is an investment of the seeds, but which, being too short for spinning, is used for stuffing cushions and other similar purposes. These are known as **silk cotton trees**, and the most important are *Bombax Ceiba*, Linn., a native of tropical America, *Bombax malabaricum*, DC., a native of India, and *Eriodendron anfractuosum*, DC., a native of India and the Eastern Archipelago, from which latter region the product of this tree has been introduced into commerce by the Dutch under the name of **kapok** or **vegetable down.** On account of its extreme buoyancy it is used in making life waistcoats. The fibres of the leaves of the screw-pine, *Pandanus odoratissimus*, Linn., a native of southern Asia, Madagascar, and the islands of the Pacific, enter into commerce under the name of **vicua,** or **vacoua,** as a material for coarse sacking. Those from the outside of the stem of the palm known to botanists as *Attalea funifera*, Mart., are exported from Brazil, under the name of **piassava,** as a material for brushes and brooms. Another palm-tree, the ubiquitous coco-nut palm, furnishes, among its numerous other products, the fibre called **coir,** which is commercially by far the most important of all these minor fibres. The fibre forms a thick matting on the outside of the nut, and is exported from all tropical countries as a material not only, like the piassava, for brooms and brushes, but also the making of door-mats, and even for the making of stair-carpets, and various other purposes.

445. TROPICAL FRUITS. Oranges, limes, dates and some other fruits are all imported into the United Kingdom and other parts of the temperate zone more or less from the tropics, but the tropical portion of the supply is insignificant. **Bananas** are the only fruit which enters into world commerce mainly from the tropics, and this is a trade that has grown important since the first edition of this work, one of the results of the development of refrigeration. They are the product of the tree or large plant known to botanists as the *Musa sapientum*, L., and its varieties, including a hardy dwarf variety known as *M. Cavendishii* or *chinensis*, suitable for cultivation in the temperate zone, and now largely cultivated in the Canary Islands. All the varieties require high temperatures, a great deal of moisture, and a deep soil. Where these conditions are satisfied they are grown almost universally in the tropics, but chiefly in isolated specimens or

[1] 1920.

small groups near the huts of natives. Central America, above all, Costa Rica, Colombia, the Canaries, and the West Indies are the principal parts of the world in which the cultivation is carried on, at no little expense, on an increasingly large scale for export, and the United States and the United Kingdom are at present the principal markets. Great stress is laid by some on the possible importance of this fruit in the future as part of the food supply of the dense populations of the temperate zone, but at present it is only a luxury, though a cheap one; and when we consider that the fruit is largely composed of water, that its nutrient value measured in calories is only 260 per pound as against upwards of 1,000 for meat and the ordinary grains, and that its protein content per cent. is only 0·8 as against 9 to 16 per cent. for bread and meat,[1] so that it would be necessary to eat 160 bananas per day to get an adequate amount of protein food in that form,[2] we can hardly but regard this anticipation as exaggerated. The extraordinary productiveness of the banana has often been spoken of (**71**), but according to Rung[3] the average weight of edible matter grown with careful cultivation on a plantation under European management is only about 5·6 tons per acre, or about one-fifth more than an average crop of potatoes in the United Kingdom.[4] Another species of Musa, the *M. paradisiaca*, L., yields the plantain, which is also grown to a large extent in the tropics as food; but it requires cooking, and hence does not enter into world-commerce. (See also **441**.)

446. RUBBER, formerly known as caoutchouc or india-rubber. Of the older names, the first is a South American name, and hence suggests the region whence the first knowledge of the substance was introduced into Europe, and whence still come the chief supplies. It was found in use in various parts of America by the early discoverers. On the occasion of the second voyage of Columbus (1493) it was noted as being used in Haiti for the making of balls. Torquemada mentions in 1615 that it was then derived from a Mexican tree, and used by the Spaniards to waterproof their cloaks. The Portuguese found it in use at an early date in Brazil for the making of syringes (whence its Portuguese name of *seringa*), but the substance and its uses first became generally known in Europe through a paper read to the French Academy by La Condamine in 1736. For more than eighty years after that almost the sole use of the substance in Europe was for the purpose which the second name suggests, namely the rubbing out of

[1] *Encyc. Brit.*, art. 'Dietetics,' p. 216.

[2] *Ibid.*, art. 'Banana.'

[3] Dr. Rich. Rung, *Die Bananenkultur, Ergänzungsheft* No. 169 to *Petermanns Mitteilungen*, p. 15.

[4] The import into the United Kingdom increased from about $1\frac{1}{4}$ million bunches in 1900 to upwards of 7 millions in 1913. If we take 37 bunches as equal to a ton (see Rung, p. 15), this latter amount is equal to about 200,000 tons, or much less than a thirtieth of the wheat imported as grain or flour in the same year.

pencil-marks. At the present time it would be difficult to say how small a fraction of the consumption of rubber that use represents, so that this second name is a constant reminder of the way in which a great industry may grow out of small beginnings. The 'India' prefixed to the term 'rubber' indicates the source from which the chief supplies of the material were got when the use was limited. The first important extension of the use of rubber was due to the invention in 1823 by Mackintosh of the waterproof fabric named after him. A still greater extension followed when Goodyear in America in 1842, and independently Hancock in England in 1843, discovered the method of hardening caoutchouc by **treating it with sulphur.** This is known as the process of **vulcanising.** A small proportion of sulphur (5 to 7 per cent.) incorporated with the rubber makes the compound adapted for a great variety of mechanical purposes, such as nearly everybody is more or less familiar with. A larger percentage (39–84) makes the equally familiar hard black compound known as ebonite. Rubber has been made synthetically in the laboratory, but there appears to be as yet no prospect of the synthetic production of rubber on a commercial basis, and at any rate not of that quality of rubber which combines in a high degree the important properties of compressibility and elasticity.

447. Rubber is the coagulated latex juice derived from a variety of trees, all tropical. To prevent putrefaction the coagulation must be effected within about 24 hours of the collection of the juice.[1] By far the largest supply is obtained from trees of the allied genera Hevea and Micrandra, growing in the forests of the Amazon valley, in Brazil, Bolivia, and Peru, not in clumps, but widely scattered amongst a great variety of other trees, as is usual in well-watered parts of the tropics. The species from which most is obtained is the *H. brasiliensis*, Müll.-Arg. (*Siphonia elastica*, Pers.).[2] The rubber derived from all these trees is known from the place of export as **Pará rubber,** and includes all the rubber of the best quality. The trees yielding the best juice are those growing on tracts of land which are annually flooded. Those growing where the roots are always submerged yield too watery a juice, and those that grow on higher ground beyond the reach of floods a juice too viscid. Another Brazilian tree, *Manihot Glaziovii*, Müll.-Arg. (an ally of the shrub yielding tapioca), furnishes **Ceará rubber,** which owes its commercial name to the province from which it is derived.

[1] A process has, however, been tried experimentally by which it is said that the juice can safely be kept any length of time, but whether this can be done on a commercial scale has not yet been ascertained. See *Times Trade Supp.*, No. 63, p. 20.

[2] Next in importance would appear to be the *Hevea lutea*, but the rubber collectors of the upper Amazon region state that they get the rubber from a dozen different kinds of trees. The trees are met with only here and there amidst the various other trees of the dense forest amidst which they grow.

The region to which it belongs is one in which rains may occasionally be plentiful, but is exposed to prolonged periods of drought, the rains sometimes failing altogether even in the rainy season. It grows chiefly on gravelly soils, or soils derived from weathered sandstone or granite. Another Brazilian tree, the *Hancornia speciosa*, Müll.-Arg., growing in the provinces from Bahia to São Paulo, yields Mangabeira rubber, exported chiefly from Pernambuco. It thrives best where there is a well-marked dry season, and flourishes on an otherwise sterile sandy soil. In Central America and the northern parts of South America, caoutchouc is obtained from *Castilloa elastica*, Cerv. It is the rubber from this tree that is locally known as caucho, the term which has given us the word caoutchouc, but this rubber is of inferior quality, and not adapted to some of the uses to which Pará rubber is put. In India, rubber is obtained from a species of fig, *Ficus elastica*, Roxb., the produce of which enters into commerce mainly through the province of Assam, and is hence known as **Assam rubber** ; in Borneo, from a species of Willughbeia ; in other parts of the Eastern Archipelago, from *Urceola elastica*, Roxb. ; in Africa, principally from various species of twining plants belonging to the genus Landolphia, but also, in Lagos and other parts of West Africa, from *Funtumia elastica* (=*Kickxia elastica*, Preuss).

448. All the species mentioned are trees, most of them confined to latitudes well within the tropics, the only exception being the *Ficus elastica*, which, however, grows in a part of India with a characteristic tropical climate. That it can grow in a different climate is shown by the fact that it is the best known of all the rubber trees, being that which is so often grown in our houses as an ornamental window plant, but with a very different aspect from that which it has in its home, where it is a massive, thick-stemmed and thick-branched tree. It may be added that though the best known it is one of the least important of the rubber trees in respect of its aggregate yield. But in addition to these tropical trees rubber juice is present in many other species, not all confined to the tropics, and in recent years a composite shrub of the temperate zone has added considerably to the rubber supply of the world. This shrub grows wild in the somewhat arid Mexican states of Coahuila, San Luis Potosi, Durango, and Chihuahua, and is locally known as guayule, the name by which its product has entered into trade. Not many years ago it was regarded as a pest on farms and ranches, but in 1911 it was selling at £20 a ton.[1] This rubber goes chiefly to the United States. A pasty substance from which

[1] *For. Off. Report*, Annual Series, No. 4943. According to the reports kindly supplied to me by Messrs. Figgis and Co., rubber brokers, London, the estimated supply of guayule rubber in the world market in 1911 was 9,200 tons; but it has since declined, partly in consequence of the Mexican revolution. Apart from that, however, the supply is said to be running short (*For. Off. Report*, Annual Series, No. 5175.)

some inferior rubber can be extracted now enters into commerce from the Eastern Archipelago under the name of jelutong.

449. The total supply of rubber was estimated by Scherzer at about 20,000 tons annually,[1] of which about half was supplied by or (from Bolivia and Peru) through Brazil. The countries taking the lead in the trade and industry connected with the substance are the United States and the United Kingdom, but the United States is far ahead of all other countries in the consumption of the raw material. Considerably more than half the British import is re-exported.

450. Notwithstanding the extraordinarily rapid increase in the consumption of this article, there is no reason to fear any exhaustion of the supply. New regions in which Hevea rubber may be collected from wild trees have still to be opened up, and regions that have for the time been exhausted recover themselves after a few years' rest. A tree that has ceased to yield juice is not killed, but in a few years will begin to yield again. Additions are likewise constantly being made to the sources of supply of other rubbers also. But the most rapid additions to the rubber supply of the world are now being made through the produce of regular plantations, in which it is possible by careful tapping to obtain annual supplies of juice from the same trees for many years in succession, and to effect other economies not practicable by the present mode of collection. Experiments began to be made with both Pará and Ceará rubbers as far back as 1876 and 1877. Through the authorities of Kew Gardens both trees have been introduced into all suitable parts of the tropics both in the Old World and the New. But the progress of rubber-planting was at first slow. At the end of last century it was still considered doubtful by a specialist dealing with the subject whether plantations with expensive European company management would pay.[2] But in this case the foresight of business men has been justified. The vast increase in the demand for rubber, accompanied by a rapid rise in price,[3] has made this industry highly remunerative. In 1905 the total quantity of plantation rubber on the world market was

[1] About 1882. In 1905 the total production was estimated at about 65,000 tons, about half of which came from or through Brazil, in 1913 about 101,000 tons (exclusive of guayule and jelutong), of which less than two-fifths came from or through Brazil, and nearly half was plantation rubber. The whole area under plantation rubber at that time was estimated to be under 2,000 square miles, or less than that of the County of Norfolk or Northumberland. Much of the raw material of the rubber industry now consists of old rubber worked up again. In 1850 the total import of rubber into the United Kingdom was far below 500 tons; in 1870 it had grown to 7,600 tons, in 1900 to 25,600 tons, in 1913 to 70,000 tons.

[2] O. Warburg, *Die Kautschukpflanzen und ihre Kultur*, p. 48.

[3] Average import price in Great Britain in 1895 £11 per cwt., in 1910 nearly £30, with a subsequent fall, however, to less than £20 in 1912, and to about £13 in 1913.

estimated at only 145 tons; five years later it had increased to upwards of 8,000 tons.[1] These plantations are chiefly in Malaya, Ceylon, the Dutch East Indies and British Borneo, India, and Burma (chiefly southern India and Mergui), but there are plantations also in tropical Africa both east and west, as well as in the American countries, in which rubber trees grow wild. The Ceará plantations at first gave little promise of success, but since 1911 regular supplies of Ceará rubber have reached the London market. The attempts made with it in the outer latitudes of the torrid zone (Bengal and Assam) were indeed failures, but in lower latitudes better results have been obtained. The trees are planted at the rate of 100 to 135 per acre. The yields in Pará rubber plantations are very variable; as much as 16 lbs. of rubber has been taken from a single tree, but this is quite exceptional. From the oldest Hevea plantation in Perak (at Kwala Kangsa) 88 lbs. have been obtained at one time from sixty trees, most of them only six years old,[2] and in other cases even greater returns have been obtained from trees of the same age. The greatest yield is said to be got from trees at least twenty-five years old. On highly cultivated and favourably situated estates in southern India, Ceylon, and Sumatra the average yield is at least 400 to 500 lbs. per acre. It is urged that this tree should always be grown as the shade tree in cacao plantations, which are suited to the same soil, site, and climate (**415**). Of other rubber trees, the most promising is the *Funtumia elastica*, which has a great advantage over the species of Hevea in having seeds of great vitality. It is being extensively planted on the Guinea coast and the Cameroon territory, and in the sixth year is said in some cases to yield from 2 to 3 lbs. of rubber. Mangabeira rubber is recommended for cultivation on red soils such as are suited for coffee, but are otherwise not very valuable.

451. Gutta-percha is the hardened juice of several other tropical trees, but the chief supply in this case comes from the East Indies, especially the Malay Peninsula and the Dutch East Indies, Singapore being the chief place of export to Europe. The tree that yields the bulk of the supply is known to botanists as *Dichopsis Gutta*,[3] Benth. Another kind is derived from another member of the same botanical family, the Sapotaceæ, namely from *Sapota Mülleri*, Blume, a native of Guiana. Gutta-percha is used for many of the same purposes as caoutchouc, and is capable in many respects of similar treatment. Mixed with carbon, it can be readily vulcanised like caoutchouc, by the

[1] In 1912, 28,500 tons, at which date the plantations in the east alone were estimated to cover 950,000 acres, on only a small proportion of which, however, the trees had been tapped, giving the prospect of a still continued rapid increase of production even if no new plantations were formed.

[2] See O. Warburg, p. 43, and report of a lecture by Mr. H. N. Ridley, director of the Botanic Gardens, Singapore, in the *Imperial Institute Journal*, No. 87, p. 71. For various interesting particulars as to the production and treatment of South American rubber see also *For. Off. Report*, Miscel. Series, No. 530, pp. 9–19.

[3] Or *Palaquium Gutta*, Burck.

addition of sulphur, either to the soft or hard state. It is very largely employed in the making of telegraph cables as an insulator in which the wires are embedded, and as England has almost a monopoly of this industry, the gutta-percha trade of the United Kingdom receives a great stimulus therefrom. At present the tree is mostly destroyed to obtain the juice, but this is not necessary. It may be tapped and preserved like rubber trees, and beginnings have been made with systematic planting in the Malay Peninsula, British North Borneo, and elsewhere.

COMMODITIES (*continued*)

D. Products of Various Climates

452. VEGETABLE OILS, OIL-SEEDS, AND OIL-CAKE. Almost all vegetable oils are extracted from the fruit or seed. The plants supplying oil vary widely in their character, ranging from small herbs to tall trees. Almost all of them belong to warm countries, that is to say, either to tropical lands or the warmer parts of the temperate zone, or if they are not confined to these regions, are there of most importance for their oil. (See **71.**)

453. The uses of vegetable oils are various. Some, such as olive-oil, ground-nut oil, poppy, sesame, and cotton-oil, are largely used as table oils, for cooking, preserving, &c.; others, including rape, cotton, and olive, are used for lighting; others, such as rape, hemp, and palm-oil, are employed in lubricating machinery; others are used in medicine and perfumery; others in making candles; others, known as drying oils, of which linseed is the most important, in mixing colours for painting, as well as in various manufactures; very many of them in the manufacture of soap (**601**), which is rapidly becoming the chief use of almost all vegetable oils, except drying, and some of the table oils, seeing that for the other purposes for which oils are required in greatest quantity, lighting and lubricating, vegetable oils are being displaced by the cheaper petroleum products (**546**). A new use for some vegetable oils seems likely to become important. It has been ascertained by experiment that ground-nut oil is nearly as efficient as mineral oil in the Diesel oil-engine, and as this oil can also be used as a lubricant, this holds out the prospect of facilitating the introduction of that engine into those parts of the tropics in which the ground-nut grows, but in which mineral oil is not easily available.

454. Among vegetable oils, the first place may properly be given to the product of the olive. This tree, originally a native, in all probability, of western Asia, is suited rather to a warm temperate than a sub-tropical climate with dry summers, and the site best suited to it is that which has a dry, and above all a gravelly limestone soil, and is well sheltered. These requirements are presented in many parts of the Mediterranean region (including Portugal), throughout which (except in Egypt) the tree is highly characteristic. Indeed, it may be fitly taken as marking both in altitude and in latitude and longitude the limits of this type of climate in different parts of the world, the tree having now been introduced wherever that type of climate prevails.

According to Theobald Fischer the number of olive trees in Spain is estimated at about three hundred, in Italy one hundred millions. In Spain there are extensive forests of it on the southern slopes of the Sierra Morena and on a tract 56 miles long in the upper part of the Guadalquivir valley, east-north-east of Cordova. In Italy, Apulia, the western seaboard of Calabria, Tuscany, and the west side of the Gulf of Genoa are its principal seats. In France the area, in the lower part of the Rhone valley, devoted to it is much smaller but the cultivation is more careful. Nowhere in recent years has its cultivation extended more rapidly than in the Tunisian Sahel, an area of about 230 square miles, with Sfax as its chief port.[1] There on the estates producing the best quality it is planted at the ratio of only about $6\frac{1}{2}$ to the acre, whereas in Spain and Italy the ratio is as much as 50 to 110 to the acre. It is a slow-growing tree, taking from 15 to 20 years to attain its maximum yield.[2]

455. In the Black Sea region the distribution of the olive illustrates in an interesting manner the influence of climate. The tree is absent from the south of Russia, except on the southern slopes of the Yaila mountains in the Crimea, which afford the necessary protection against cold northerly winds. Under the shelter of the Caucasus Mountains it occurs in Trans-Caucasia, where it grows both wild and under cultivation in many districts. In the north of Asia Minor the olive thrives admirably along the whole coast from Trebizond to Samsun, and in ancient times extended to Sinope; that is, it occupies or once occupied the whole of that part of the coast looking north-eastwards and participating in the shelter afforded by the Caucasus Mountains. It is excluded, however, from that part of the coast which looks north-westwards, and is liable to be swept by cold winds from southern Russia.[3]

456. Outside of the regions considered in the preceding paragraphs, the tree may be grown in many parts of the world, but there are few of these in which olive-oil is an important product. The tree thrives in Mexico, and also in Peru and other parts of South America, where it was introduced as early as 1560; but in these parts its fruit is said to be unfit for use in the extraction of oil. It has long been cultivated with success in South Australia, and olive plantations are already so extensive in California that home-grown table olives have already driven the foreign article out of the markets of the United States.

457. In quality the bulk of the Italian oil is inferior to that of France (the Provence oil), but the oils of Lucca in Tuscany and of Liguria are unsurpassed. The export of Italian oil is chiefly to France,

[1] See Fig. 111, p. 182, of Brunhes, *La Géographie humaine*, 2nd ed. (Fig. 90, p. 232, 1st ed.).

[2] Fischer: *Der Oelbaum, Ergänzungsheft* No. 147 to *Petermanns Mitteil.* 1904.

[3] Tchihatchef, *Klein-Asien*, p. 70.

which consumes much more oil than it produces, and has itself little or no export of this commodity. The United Kingdom derives olive-oil more largely from Spain than Italy, and the other countries from which it is chiefly brought to England are Turkey (including Asia Minor and Syria, in some parts of which olives are very abundant), Morocco, and Tunis, the fine oils of which last are steadily driving the inferior oils off the best markets. The inferior kinds are much used in the making of soap.

458. Cotton-seed oil is now very largely used as a substitute for olive-oil, from which it can scarcely be distinguished in flavour. The seed is chiefly exported from Egypt and India, and the refining of the oil has become a great industry at Hull. Besides the refined oil the seed yields much oil that is mixed with beef products to form compound lard, and the inferior kinds are used in the making of soap, candles, and phonograph records. The refuse cake (**360**) or meal may be used either as a cattle-food or a fertilizer, and the hulls in the form of bran can be used without any other feed to fatten cattle.

459. Linseed, rape-seed, and the **sesame** of commerce are the three principal oil-seeds furnished by India, and they are all exported for the most part before the extraction of the oil. **Linseed,** as already intimated, is merely another name for flax-seed. The great bulk of the British import of this article is derived from British India, the Argentine Republic, and Russia. The useful property of drying on exposure to the air, a property already referred to as rendering this oil the most important of those employed in mixing colours for painting, as well as in making varnishes, adapts it for many other uses, which help to give it a very important place in the arts. When treated with sulphur it forms what is called **linoleum,** which is a soft substance capable of being used for many of the purposes of india-rubber or gutta-percha. Dissolved and mixed with colouring-matter, it is then employed to cover various textile fabrics with a waterproof varnish, thus forming the so-called **wax-cloth**; but it is probably now most extensively used in the making of **linoleum floorcloth,** which consists of ground cork and linoleum mixed together and pressed upon canvas.

460. Rape-seed is the seed of two or three species of the cabbage genus (*Brassica*) extensively grown in Europe as well as India. **The oil** made from it was **formerly** the chief **lighting agent** in North and Central Europe; and **colza-oil,** which is that derived from *Brassica rapa*, var. *oleifera*, DC., is still of great value for use in lamps. It is **now** more largely used as a **lubricant,** and even for this purpose is likely to be displaced in course of time by paraffin and petroleum.

461. The sesame of commerce is the seed of a herb which was grown for its oil both by the Egyptians and Babylonians of ancient times, as it now is in India and Asia Minor. The oil is called in India til or jinjelly, and is used as a table-oil as well as for lighting. The seed is the richest in oil of all the important oil-seeds, yielding oil to the amount of more than half its weight. The **beniseed** of West Africa is derived from a member of the same genus. **Poppy-seed,** which yields an oil used for cooking and for mixing colours, as well as in soap-making, is **exported** chiefly from **India,** the bulk of the export going to **France.** From India, France also derives large supplies of **ground-nuts** (**274**), the oil obtained from which is now employed for the same purposes as olive-oil; but by far the largest supplies of this commodity are obtained from the tropical parts of **West Africa. Castor-oil,** which is expressed from the seeds of a tropical tree or shrub belonging both to the Old and New World, enters into commerce chiefly in the form of the oil, and

only to a small extent in the form of oil-seeds. **India** is the chief source of supply. The oil is used in soap-making as well as in medicine, but now more as a lubricant for aeroplanes than for any other purpose. In China it is used as a table-oil.

462. Two palm-trees yield large supplies of oil. That which yields the oil generally distinguished as **palm-oil** is the tree known to botanists as *Elæis guineensis*, Jacq., that is, the Guinea oil-tree—a name by which it is very appropriately designated though it is found more or less in West Africa between 10° N. and 10° S. There is now the prospect of a large export of palm-kernels (under the name of babassu nuts) and oil from the north-east of Brazil. Like the product of the next tree, palm-oil is largely used in soap and candle-making, being combined with stearine (**494**) for the latter purpose. Another important use of this oil is in the tin-plate trade. The iron sheets, before being tinned, are dipped in a hot bath of this oil to prevent oxidation. **Coco-nut oil** is expressed from the kernels of the coco-nut, which grows very widely on tropical islands and tropical coasts, but is seldom found far from the sea. The dried kernels of the coco-nut also enter largely into commerce under the name of **copra** (**489,** under Margarine). To a smaller extent it is exported in a powdered condition as **desiccated coco-nut** for use in confectionery.

463. Oil-cake is a general name for the masses of crushed seeds that remain after the oil has been pressed out of them, and it is now very largely used in the feeding of **cattle,** which it fattens very rapidly ; frequently also as a manure (**360**). It is chiefly derived from linseed, rape-seed, and cotton-seed,[1] but also from coco-nut, in which form it is known as *poonac.*

464. Of the ethereal, essential, or volatile oils—that is, oils that can be evaporated and recondensed without changing their nature—the most important is the oil or so-called **spirit of turpentine,** obtained by distillation from the resin of various firs, pines, and other cone-bearing trees. It is very largely used to dissolve resins, and in the making of paints and varnishes, as well as for cleaning. Almost all the British import is from the United States.

VEGETABLE WAXES, see Wax (**498**).

465. GUMS, RESINS, AND OTHER VEGETABLE EXTRACTS, exclusive of those used chiefly as Drugs, Narcotics, Tans, or Dyes, and Vegetable Waxes. **Resin** is a general name for a variety of substances, which are all originally fluids in the tissues of plants, but which become solid, which are all more or less clear or translucent, though generally with a tinge of colour, which are all inflammable and insoluble in water, but soluble in alcohol and the essential oils, such as oil of turpentine (**464**). They generally exude in a fluid state from the stems and branches of trees, but are sometimes found in hollow spaces in the wood, or lying in the ground where the trees yielding them have grown. **Gums** resemble resins in appearance and origin, but differ in being soluble in water, but insoluble in alcohol and essential oils.

466. The resin which forms by far the most important commercial commodity, so far as quantity is concerned, is that which is entered in the 'Annual Statements' of British trade as **rosin.** It is used in the making of paper (**580**) and soap (**601**), and for many other familiar purposes. It is the substance that remains behind from the distillation of turpentine after the oil of turpentine has been separated, and hence is imported, like the latter commodity, mainly from the United States. From Russia and Sweden, the European countries which have the greatest abundance of cone-bearing trees, comparatively little rosin or oil of turpentine is exported ; but, on the other hand, these are the chief sources of supply for **wood-tar and pitch,** which are obtained from the timber of the same group of trees, by burning it in covered pits in such a manner that no flame is produced. From tar, creasote, an excellent preservative of timber, is made by a complicated process. The export of tar from the United States is comparatively small, though there is a

[1] Imported mainly from the United States, Egypt, and Germany.

large production of the article for home use. **Burgundy pitch**, which is used as an external application in medicine, is properly a kind of resin obtained by treating the natural resin of the silver fir (**common frankincense**, as it is called), and when genuine is principally imported from the continent of Europe; but the substance so called is now largely manufactured from rosin or turpentine.

467. The other resins of commerce are principally used either in the making of varnishes and lacquers, or for burning as incense. The chief of those employed for the former purpose are **dammar**, the product of a cone-bearing tree (*Dammara orientalis*, Lamb.) which grows in the Eastern Archipelago; **kauri gum**, the resin of the New Zealand pine, which is another species of Dammara (*D. australis*, Lamb.); copal, obtained from various tropical trees; and **sandarach**, the product of a cone-bearing tree belonging to Algeria and other parts of north Africa. **Kauri gum** is principally derived not from trees still standing, but is dug in large lumps out of the earth over a large part of the North Island of New Zealand, where forests of this tree formerly existed. It forms the finest of all resins for varnishes. **Copal** (frequently known as gum copal) is obtained both from the Old World and the New. The best sort is said to be that derived from a tree growing in the west of Africa (Angola and Benguela), but it is also obtained from the east of Africa, India, the Eastern Archipelago, the West Indies and South America. **Mastix**, the product of a species of Pistacia which grows in various parts of the Mediterranean region, but above all on the Island of Chios, is now not so much used in the making of varnishes and lacquers as formerly, but is still largely consumed in the Levant as a material for chewing to cleanse the teeth and strengthen the gums, as well as in other ways. **Dragon's-blood**, a red resin which exudes from several trees belonging to the tropics of the Old and New World, is imported for the colouring of varnishes and for use in making wood-polishes.

468. To the list mentioned in the last paragraph may be added **amber**, which is nothing else than the resin from certain extinct cone-bearing trees. Though chiefly employed in the making of a variety of ornamental articles, amber is also used in making varnishes. It is principally obtained on the Baltic coast of Prussia, between the Frisches Haff and the Kurisches Haff, whence the article, which was very highly valued in antiquity (**4**), was conveyed by several routes to the civilised countries round the Mediterranean. At the present day amber seems to be most valued for ornamental purposes in China, where it is regularly imported in considerable quantity. The substance is occasionally obtained at various points on the shores of the Mediterranean, and more regularly on the coasts of China and Siam. Some kinds of **copal** are, however, frequently substituted for the true amber, and sold as such, being hard enough to be applied to the same purposes as the genuine article.

469. Of resins used to burn as incense, the most important are olibanum, or the **true frankincense**, the product of various species of trees belonging to the genus Boswellia, natives of Africa, southern Arabia, and India; **myrrh**, the product of species of Balsamodendron belonging to the same regions; and **benzoë**, derived from the bark of a tree called *Styrax Benzoïn*, Dryand., which grows in Indo-China and the Eastern Archipelago. This last substance is largely used not only in the ceremonies of the Roman Catholic Church, but also in the religious services in Eastern Asia; in India and China it is also employed in the making of cosmetics, and by the rich to fumigate their rooms. In Japan it is mixed with tobacco for smoking.

470. The **gum arabic** of commerce is derived from various species of Acacia growing in different parts of the world. The best kind is imported into Europe, most largely from northern Africa, chiefly by way of Egypt and Nigeria, and, according to Schweinfurth, is mostly derived from the *Acacia senegalensis*, Ait. (*A. Verek*, Guill. et Perott.), a tree found throughout the Sudan from the west to the east of Africa, and also in the arid portion of India immediately to the north-west of the Deccan Peninsula. The trade in that portion of the gum which is

introduced into Europe from the Senegal region is in French hands, and it is imported into other countries mainly from France. The *A. arabica*, Willd., which grows over the whole region occupied by the former species, and also in southern Arabia, supplies a portion of this gum; and so also does the *A. gummifera*, Willd., a native of the countries lying to the north of the desert of Sahara. Large quantities of inferior gum are exported from the African ports on and near the Red Sea, but these reach this country chiefly through Bombay, and hence are entered in the 'Annual Statements' of British Trade as from the British East Indies; for, notwithstanding the fact that both the Sudanese trees yielding gum grow also in India, and a useful and strong adhesive gum is obtained from the *A. Catechu*, Willd., which is more widespread in India, and is mentioned elsewhere (**575**) as supplying a tanning and dyeing material, the export trade in native Indian gums still awaits development. Among other sources of supply of this commodity are south Africa, where it is obtained from the *A. horrida*, Willd., and Australia, where it is chiefly derived from the *A. pycnantha*, Benth., which supplies also a powerful tanning bark (**574**).

The only other important gum of commerce—not counting the so-called gum-lac (**499**)—is **gum tragacanth,** the product of several species of Astragalus belonging to the countries surrounding the Mediterranean. It is principally exported from Smyrna, in Asia Minor, and is used as a vehicle for applying discharges (chemical agents for removing colour) in calico-printing, as well as for other purposes. **Camphor** is mainly derived from a species of cinnamon (*Cinnamomum camphora*), which grows in Japan, Formosa (where it is a government monopoly), central China, and the Malay Peninsula, and is extracted by distillation from the wood and leaves, but also from a large Bornean tree, the *Dryobalanops aromatica*, on which it appears as an exudation from the fissures.

471. SPICES, STIMULANTS, AND CONDIMENTS. The most important spices are all products of the torrid zone. Only three—pepper, ginger, and cinnamon—are entered separately in the 'Annual Statements' of British Trade, and the order in which they have been mentioned indicates their relative importance as imports. Usually more than three times as much pepper as ginger is imported, and about twenty times as much pepper as cinnamon; and the values of the several articles give a still higher ratio to the excess of the import of pepper over that of the other two. As to the former importance of pepper and other spices in commerce, see **1064**.

472. Under the name of **pepper** several different articles are sold in the shops. **Peppercorns and black and white pepper,** which make up the great bulk of the pepper of commerce, are **all derived from one species,** a twining and climbing plant, *Piper nigrum*, Linn., belonging to southern India, the Eastern or Malay Archipelago, and Indo-China, and largely cultivated in those regions for the sake of its spice, which is the most generally used of all spices, both among rich and poor. The peppercorns are the whole berries, and black and white pepper the same ground, with this difference, that to make white pepper the peppercorns are first deprived of their outer skin by steeping them in water for several days. Ninety per cent. of all the pepper imported into this country comes from the **Straits Settlements,** but more than half of this import is the product of **Java, Siam,** and **French Indo-China,** collected at Singapore. A considerable quantity, however, is the product of the Straits Settlements themselves, and most of the remainder is derived from the **Malabar coast of India.** Another species of Piper (*P. longum*, Linn.) produces **long pepper,** which is the dried unripe fruit of that shrub; a native of the same regions as the last, but extending to a more northerly latitude. **Cubebs** are the berries of another species (*P. Cubeba*, Linn.), belonging to the same region, and a fourth species, the **betel** (*P. Betel*, Linn.), furnishes the leaves which are used along with **areca-nut** and other ingredients to compose the favourite stimulant chewing-mixture of the people of India. **Cayenne pepper** is the product of a totally different plant, being the ground pods of different species of **Capsicum,** one

of which has smaller pods, used entire in pickling, under the name of **chillies.** Originally natives of South America, they are now grown in tropical countries in the Old World as well as the New, and even in the warmer parts of the temperate zone, as in Spain and Hungary. The United Kingdom is the great market for all kinds of peppers, and re-exports on an average about two-thirds of her whole import.

473. Ginger, a spice known to the ancient Greeks and Romans, and much liked in the middle ages, is the **dried root-stock of a plant** known to botanists as *Zingiber officinale*, Rosc., **a native of south-eastern Asia,** but now largely cultivated also in the West Indies and the British settlements in West Africa. Almost all the British **imports** of this commodity are from parts of the British Empire—principally the British East and West Indies. The West Indian article has the higher average value.

474. The **cinnamon** of the shops is the **product of two different trees,** in both cases the bark (ground or unground) of the smaller twigs. One of these, the dearer and better of the two, is derived from the *Cinnamomum zeylanicum*, Nees., or Ceylon cinnamon, and is distinguished in commerce as the **true cinnamon,** although it seems probable that the *cassia lignea* of commerce, the product of the *Laurus cassia* of Linnæus, was the cinnamon of the ancients, the so-called true cinnamon not having been discovered till the thirteenth century of the Christian era. The Ceylon cinnamon is very exacting as to soil and climate, and hence is restricted to limited areas. It is the product of this tree alone that is entered as cinnamon in the 'Annual Statements,' and all but a small fraction of the import of this commodity into Great Britain is still **derived from Ceylon,** though the tree is also grown on the islands of the Eastern Archipelago, and has been introduced into the West Indies and South America. The *Laurus cassia* is much more widespread, growing wild (as well as cultivated) in the tropical and sub-tropical parts both of the Old and New World; but the greater part of the **cassia lignea** of commerce is obtained from **China.** The total annual produce of cassia in the world is estimated at half as much again as that of cinnamon.

475. Of the unenumerated species of the 'Annual Statements' two of the most important are cloves and nutmegs (including mace), both produced chiefly on the Moluccas or Spice Islands, but imported into this country mainly by way of Singapore. **Cloves** are the flower-buds of *Caryophyllus aromaticus*, Linn., dried before opening; **nutmegs** are the kernel of the fruit of another tree, *Myristica moschata*, Willd., and **mace** the investment of that kernel. Both trees are natives of the **Moluccas,** to which the Dutch for a long period confined them,[1] retaining for themselves the monopoly of the trade in these spices. Both trees have now, however, been introduced into other parts of the world; both of them into the Straits Settlements and British India; and the clove-tree into many parts of the torrid zone, both in the Old World (Zanzibar, &c.) and the New. **Kola nuts,** which contain caffeine, and are largely used as a stimulant in tropical Africa, are derived from a tree (*Cola acuminata*, Schott and End.) which has also been idtroduced into the New World. The leaves of the **coca** shrub (*Erythroxylum coca*, Lam.), a native of the east side of the tropical Andes, have been known since the discovery of those regions to impart when chewed an extraordinary power of enduring fatigue, and now enter into commerce as the source of the alkaloid cocaine.

476. The greater quantity of the remaining unenumerated spices are derived from the British West Indies, and among those having this origin the most important is **pimento,** or **all-spice,** the unripe dried berries of the *Pimenta officinalis*, Lindl., which is cultivated chiefly on the island of Jamaica. Among the minor spices in European trade may be mentioned **cardamoms,** which are, however, the most valuable of all Indian condiments. They are grown to such an extent on the mountains of southern India, that the name of Cardamom Hills is given to the range forming the background of the native state of **Travancore. Vanilla** is the pod of a twining orchid originally belonging to **Mexico** and South America, but long since successfully introduced into the tropics of the Old World, including the

[1] Cloves to Amboina, nutmegs to Banda.

Islands of **Bourbon** and **Mauritius,** which now rival Mexico in the production of this commodity. **Cummin,** the seed of a plant native to the upper Nile regions, but introduced at an early age into southern and eastern Asia, was an important spice in ancient times and in the middle ages, but now plays little, if any, part in European commerce. **Star-anise,** the seeds of a tree (*Illicium verum*, Hook. f.[1]) belonging to southern China, is imported into Europe in considerable quantity as a flavouring for spirits. The chief spices and condiments grown in **European countries are fennel, caraways, coriander, aniseed, and mustard.**

477. DYE-STUFFS FROM THE VEGETABLE KINGDOM. Some of the most important of these are extracted from the heart-wood of certain trees, and the woods yielding them (chiefly the products of tropical countries) are imported into industrial countries in considerable quantity under the heading dye-woods. In the 'Annual Statements' of British Trade there is only one wood of this class sufficiently important to be separately enumerated, this being **logwood,** a wood of a dark-red colour yielding an extract which is largely used in dyeing blue, brown, and black. It is the wood of the *Hæmatoxylon campechianum* of Linnæus, a lofty tree which owes its specific name to the fact that it is very abundant in the district of Campeachy in the Mexican province of **Yucatan.** It is, however, chiefly imported from the West Indies and British Honduras. The dye-woods not separately enumerated are imported into this country in largest quantity from Central America, which of late years has been furnishing greater and greater supplies of this class of merchandise. One of the principal dye-woods so entered is **fustic,** a wood yielding a yellow colouring-matter, but chiefly used in combination with other materials to produce differently coloured dyes. It is the product of a tree known to botanists as *Maclura tinctoria*, Don, and is now exported mainly from Nicaragua under the name of **mora-wood.** Another yellow dye-wood, the product of *Rhus Cotinus*, Linn., a tree of the same genus as those which yield the sumach of commerce (**576**) and the Japanese wax (**498**), is imported under the name of **fustic** from southern Europe, and is sometimes, owing to a misapprehension, distinguished as **young fustic.** Next in importance to fustic among the dye-woods of Central America is the **red Brazil wood,** the product of *Cæsalpinia brasiliensis*, Sw., and imported also from Brazil and other parts of South America. A still finer red dye-wood is the **camwood** of commerce, the product of *Baphia nitida*, Afzel., a native of western Africa. A species of Cæsalpinia (*C. Sappan*, Linn.) belonging to India and the south-east of Asia yields a yellow dye from its wood. Sappan wood is exported to some extent for the sake of this dye, though from India it is chiefly the dye itself that is exported. Besides the so-called young fustic there is one other dye-wood of importance derived from the temperate zone, the **quercitron** of the United States of America, this being the ground bark of a species of oak (*Quercus tinctoria*, Willd.), used in tanning, as well as in dyeing. It imparts a bright yellow colour.

478. The substances of vegetable origin entered as dye-stuffs in the 'Annual Statements' are either parts of herbs from which dyes may be extracted, or extracts used in dyeing, whether derived from herbs or from the wood of trees. Of such dye-stuffs by far the most important is **indigo,** the fine blue dye obtained chiefly from a shrub *Indigofera tinctoria*, Linn., a native of the tropical parts of south-eastern Asia. Till the end of last century it was an important import from India, where it was cultivated chiefly in Bengal and Madras, but since the successful production of **indigotin,** an indigo dye produced synthetically in German dye-works, the production of vegetable indigo has greatly declined.[2]

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[1] See *Kew Bull.*, No. 18, p. 73.

[2] In India the area under indigo fell from 1,366,500 acres in 1897 to 803,700 acres in 1901, and the amount of exported indigo fell from a maximum of 187,337 cwts. in 1895–96 to 89,750 cwts. in 1901–2. Meanwhile the export price fell from an average of above £19 to below £14 per cwt. Before the war the import of indigo into the United Kingdom from British India sank to a minimum of 1,974 cwts. In 1917 it was 13,501 cwts., in 1920, 1,684.

479. The other dye-stuffs of vegetable origin separately enumerated in the 'Annual Statements' are madder and safflower, besides cutch, gambier, myrobalans, and sumach, which are also used in tanning (**573-78**). **Madder** is entered as madder, madder-root, garancine, and munjeet, garancine being the colouring principle extracted from the madder-plant, and munjeet, Indian madder (*Rubia cordifolia*, Linn.). The European madder (*Rubia tinctorum*, Linn.) was formerly grown in various parts of the mainland of Europe, being the principal source of certain dyes, chiefly red, but also yellow; but the discovery in 1868 of the method of preparing similar dyes much more cheaply from coal-tar products (**608**) has gradually almost extinguished this industry, as well as the extraction, except for local use, of other red and yellow dyes from the flower-heads of the **safflower** (*Carthamus tinctorius*, Linn.).

480. Cochineal, a red colouring-matter obtained from the dried bodies of an insect (*Coccus cacti*, Linn.), belonging to the same genus as that which yields the lac of India (**499**), and the same genus as the kermes insect which lives on the kermes oak in the Mediterranean region, and yields another red dye, the 'scarlet' of the Bible, is still imported from the Canary Islands, where the plant on which the insect feeds (*Opuntia coccinillifera*, Linn.) is largely grown for the sake of this product.

481. Of the dye-stuffs not separately enumerated in the British tables, one of the most important is **annatto** or **arnotto,** a reddish-yellow dye chiefly used for silks, and therefore (**347**) more largely imported into France than any other country. It is derived from the fruit of a tree (*Bixa orellana*, L.) belonging to tropical America, and into France is chiefly imported from Guadeloupe. Two lichens may be mentioned yielding dyes of some importance. One of these, *Lecanora tartarea*, Ach., is obtained to a small extent from the rocks of Scotland and Wales, but more abundantly from Sweden and Norway, and is used as a red dye under the name of **cudbear.** It also is specially suited for silk-dyeing. The other, **archil** or **orseille** (*Roccella tinctoria*, DC.), grows on tropical rocks and trees, and is imported from the Canary Islands and various parts of the tropical regions of Africa and America. It is stated to be one of the products most abundant in the Congo basin. From it two dyes are obtained—a purple-red dye and a blue dye—the latter of which is distinguished as **litmus,** and, among other uses, is employed to colour papers used by chemists as tests for acids, which change such papers from blue to red. Under the name of **yellow berries** the fruits of trees of the buckthorn genus (*Rhamnus infectorius*, Linn. &c.) are imported in considerable quantity from Smyrna for the sake of a yellow dye which they afford. **Gamboge,** the hardened sap of a tree belonging to Indo-China and the Eastern Archipelago, *Garcinia morella*, Desv., and **turmeric,** an extract from the underground stem of *Curcuma longa*, Roxb., a plant belonging to the same regions and also to China and India, are imported as yellow dyes, but are more used in the making of coloured varnishes and for other purposes in the arts than for dyeing fabrics. Turmeric is used, like litmus, to colour test-papers employed in chemistry.

482. The dyes already mentioned include only a very small number of those which can be extracted from members of the vegetable kingdom. In India it is said that over three hundred dyes and tans are known to the natives, and the majority of these are believed to be in regular use. But the use of most vegetable dyes is rapidly giving way before those already referred to as made from products of coal-tar.

483. TIMBER.[1] This is one of those bulky commodities which requires a vast amount of shipping for their transport. About the end

[1] 'A most valuable practical test of the increased consumption and the growing scarcity of timber is the advance in prices. It has been estimated that in Germany from about 1550 to 1750 wood quadrupled in price, from 1750 to 1830 the pro-

of the nineteenth century the annual import into the United Kingdom was about 6½ million loads, each 50 cubic feet (half a register ton of shipping), in addition to about 200,000 tons of furniture and other hard woods, and manufactures of wood (entered in our tables only by value) to the value of upwards of £1,000,000. The British import of pit-props alone amounted then to nearly two million loads of the value of more than £2,000,000.[1] Timber is, for the most part, exported on a large scale only where there are exceptional facilities for water transport. Most of the timber of commerce is obtained from **firs** and **pines.** It is exported in the form of logs, deals, deal ends (deals less than six feet in length), planks, and boards ; sometimes in the form of shooks, that is, sets of staves for barrels. The four European countries exporting in pre-war days an excess of timber were Russia, Sweden, Norway, and Austria-Hungary ; and the United Kingdom is still that with the greatest excess of imports. In America, the United States and Canada both export timber and timber products to the value of several millions sterling. The chief Canadian exports under this head to the United Kingdom are in the form of sawn or split, planed or dressed fir. In all of the exporting countries mentioned **fir** and **pine** predominate, but **oak** is a very large export from both the American countries named, as well as from central Europe. Elm, beech, walnut, maple, are among the other important timber-trees of the temperate zone, and the spotted wood of the New England sugar-maple (**433**), known as bird's-eye maple, is highly esteemed for cabinet work.

484. Mahogany is the wood of *Swietenia mahagoni*, L., a large tree belonging to tropical America, including the West Indies. The best quality is obtained from the Island of Hayti ; inferior sorts from Cuba, Jamaica, Mexico, and British Honduras. When grown on marshy ground, like most of that of British Honduras, the timber is comparatively soft and of poor quality. Under the name of mahogany various red cabinet woods are now largely imported from West Africa. **Teak,** the only other timber specially mentioned in the 'Annual Statements' of British Trade, is of the highest value for shipbuilding and in construction generally, being as hard and durable as oak, and having at the same time this advantage over oak, that while the latter timber is said to promote rust, teak contains an oil which tends to preserve iron by preventing rust. It is chiefly imported from Burma (**1074**) and Siam,

gressive increase of price was at the same rate, but from 1830 to 1880 the rate was much higher, reaching in some cases 300 per cent. within the half-century. What was worth 100 francs in 1840 was worth 150 francs in 1850, 260 francs in 1860, 360 francs in 1865, and 400 francs by 1877. In the United States prices rose 100 per cent. between 1874 and 1882 ; and an equal rise took place in Russia ; while in Sweden and Norway, between 1847 and 1882 (thirty-five years) a rise of from 150 to 200 per cent., according to species, occurred.'—G. S. Boulger, *Wood*, pp. 127–8.

[1] In 1913, 3,451,000 loads of the value of £4,445,000 ; in 1920, 2,004,000 loads of the value of £9,369,000.

but is largely grown in other parts of the East Indies. It is obtained almost solely from the banks of natural waterways, but, as the wood when full of sap is heavier than water, the tree has to be killed, by cutting off large rings of the bark, to allow of it being floated down stream. **Ebony** is a name given to the wood of various trees. The hardest, blackest, and most valuable kind is the product of *Diospyros Ebenum*, Koe., a native of India. **Rosewood** is another name given to several different kinds of timber, the best being derived from various species of Cæsalpinia; the best of all, it is said, from *Cæsalpinia brasiliensis*, Sw. The term **cedar** is used with equal laxity, being applied to a number of trees whose wood is thought to resemble that of the true cedar of Lebanon in colour or appearance or both. The cedar of Lebanon furnishes none of the timber of commerce. The **white cedar** is derived from *Juniperus oxycedrus*, L., *Cupressus thyoides*, L., and other trees; the **red cedar** (used in making pencils) from *Juniperus virginiana*, L., and *J. bermudiana*, L. Most of the cedarwood of commerce comes from the West Indies and Central America. Red woods derived from two gigantic species of Eucalyptus—**jarrah**, or *Eucalyptus marginata*, and **karri**, or *E. diversicolor*—are now largely imported from Western Australia for the manufacture of paving blocks, furniture, and other purposes. The wood of the jarrah is also very useful in making piles to be sunk in water, as it has remarkable durability in water both salt and fresh. They both grow in restricted areas in the south-west of the state.

485. FURS. The fur trade has some peculiar features. It is the most valuable of those which depend for the greater part of their supplies upon the hunter, including the seal fisher. It is a trade that deals in the skins of a great variety of different animals of all sizes and differing greatly in value, and hence its **products** are **collected in a few great markets** where merchants and manufacturers can supply themselves with the kinds best suited to their own special market or branch of industry. The regions from which the furs are collected are almost exclusively the temperate and cold parts of the world, the finest sorts being all from the colder regions. Most of the furs come, therefore, from the northern hemisphere, where there is the greatest area of land in the latitudes from which they are derived. The furs derived from North America and the adjacent seas are collected, to a large extent, at the **New York** market, but in still greater quantity reach the **London** market, which also receives large supplies from the southern hemisphere as well as from Europe. The furs of Siberia and northern Russia are principally collected at **Nizhniy-Novgorod**; but the greatest fur-market of the world is that of **Leipzig**, which receives supplies not only from the great markets already mentioned in the east and west, but also direct from almost all the minor markets in different parts of the globe. This pre-eminence it owes to its central situation, not only as regards the sources of supply, but also

as regards the region in which furs are mostly worn, fur garments being more in demand in central and eastern Europe than in western Europe, where the winters are relatively mild (**619**). They are also largely worn by the well-to-do classes in China (**1111**).

486. To enumerate all the animals that contribute a share to the fur trade would be to mention nearly all the land mammals belonging to the colder parts of the earth, as well as a good many of those belonging to more temperate regions, and several marine mammals. Among those **which supply the greatest number of skins** to the trade are **squirrels, hares, rabbits, musk-rats** (a kind of beaver belonging to North America), **coypus** (a beaver-like animal whose skins are imported, under the name of nutria skins, mainly from the region round the River Plate in South America), **cats,** and **seals,** all of which are, it is estimated, slaughtered for their fur to the number of at least a million annually ; but among those which yield the furs **of greatest value** are the **sable** (from Russia and Siberia, and from North America), the **stoat or ermine** (from Europe and Asia), the **sea-otter** (from the west coast of North America), the **black** or **silver fox,** and the true **fur seal.** The coat of the blubber-seal (**495**) is of but little value, and the true **fur seal,** which yields the valuable sealskin of commerce, is a species belonging to a group **distinguished** from other seals **by the possession of external ears.** This species is obtained chiefly on the **Pribilov Islands,** two small islands in Bering Sea, where they come annually to breed. Under the regulations of the Government of the United States only 100,000 may be killed there every year. The species is also hunted by Canadian sealers in Bering Sea and the North Pacific.

487. The fur trade of British North America was for a long time the monopoly of a company called the **Hudson's Bay Company,** which was founded in 1670, and had conferred upon it the exclusive right of capturing fur-bearing animals, and buying furs in the entire region draining into Hudson's Bay. A still wider range of territory was brought within their monopoly at a later date, and remained so till 1860, when the company's claims were again reduced to the tract embraced by the original grant. This also was sold in 1869 to the Dominion of Canada, though the company still retained in its possession certain stations and a portion of the land. During the enjoyment of its monopoly enormous profits were made by the company, which purchased by means of beads and cheap trinkets the furs of animals trapped or otherwise captured by native Indians and brought by them to their agents. Now there are several other fur-companies operating in the same region. The Russian fur trade has been from the first to some extent in the hands of the Russian government, a portion of the revenue of the Siberian provinces being paid in the form of sable, squirrel, and other skins. Large numbers of skins are now derived from **Australia** and **New Zealand,** but these are chiefly **rabbit-skins** of little value (**126**). The skins of **kangaroos** and other marsupials,

however, supply a somewhat more valuable commodity to the fur trade.

488. MEAT. Not very long ago considerable quantities of the meat supply of the United Kingdom were obtained from the larger domestic animals imported alive; but the trade in these is of comparatively little importance, and is apparently destined to cease altogether. By far the largest supplies of imported fresh meat are now, however, obtained by the process of refrigeration. This process was first tried, with more or less success, about 1875 in America in the chilling of beef, a process by which the meat is cooled only to a temperature of 29° to 30°F., and is not hardened. This process is seldom applied to mutton, but both beef and mutton are carried in large quantities frozen at temperatures of from 10° to 15° F., in which case they have to be thawed out before being ready for consumption, and it has since increased with great rapidity.[1] The freezing of mutton was attempted in Victoria and New South Wales towards the end of the seventies, but it then proved a failure. The trade in frozen mutton began in earnest in 1881. The principal market for these products has always been the United Kingdom. In that year the import first exceeded 10,000 carcases (all from Australia). If it had not been for these supplies it is probable that the cost of living would have been greatly enhanced in this country, and a more or less serious check given to the development of our manufactures. The principal sources of frozen meat are Australia, New Zealand, the Argentine Republic, and other South American countries. Chilled beef comes mainly from the Argentine. But the demand for these commodities is increasing so rapidly that these sources of supply seem likely to prove inadequate, and Rhodesia, Madagascar, the Senegal, and Brazil are looked to as

[1] In 1890 the total import had risen to nearly 3,000,000 carcases of mutton and lamb, besides 76,000 quarters of frozen and more than 150,000 tons of chilled beef. In 1907 the mutton and lamb carcases imported exceeded 10,000,000, and in 1910 the number was nearly 13,000,000, but since then this branch of the trade down to 1913 has been stationary. By 1913, however, the import of frozen beef had grown to upwards of 2,600,000 quarters, or about 197,000 tons, and the chilled beef to above 260,000 tons. The total import of chilled and frozen beef and mutton in that year was 720,000 tons, which was estimated to make up about 40 per cent. of the total consumption of the United Kingdom, and this estimate of course does not take into account meat imported in other forms—bacon, hams, &c. The table on p. 765 shows the official estimates of the proportion of imported to home supply of meat when these are included. In 1917 the import of chilled and frozen beef and mutton had sunk to 433,000 tons, but in 1920 had risen to 810,000 tons. At present the import of frozen meat into other European countries (Italy, France, Germany, &c.) is small, but perhaps the most striking feature of this trade in recent years is that whereas in 1907 the United States was the largest supplier of meat to this country (in the form of beef and live cattle), in 1913 the supply received from that source was quite small, and the United States had become a large importer of Australian and South American meat. (Particulars mainly taken from Messrs. W. Weddel & Co.'s *Annual Reviews of the Frozen Meat Trade*, kindly sent by the compilers to the author. See also the important paper by R. H. Hooker on "The Meat Supply of the United Kingdom," in the *Jour. R. Stat. Soc.*, vol. lxxii., more particularly the diagram on p. 332 and the consumption estimates on p. 333; also pp. 351, 386, &c.)

regions likely to furnish additional quantities in the future, but the liability of cattle to various devastating diseases makes the outlook, more particularly in the warmer parts of Africa, very problematical. The practice of preserving by cold has been extended to rabbits, poultry, fish, fruit, milk, eggs, cheese, butter, hops, and other commodities.

Pork, bacon, hams, and lard were all formerly derived mainly from **North America (1294)**, but Denmark now leads in bacon. **Poultry and game** are derived mainly from the adjacent parts of the **European Continent.**

489. MISCELLANEOUS PRODUCTS CHIEFLY OF ANIMAL ORIGIN. Before the war Russia, Denmark, Austria-Hungary, France, and Italy were the only European countries of importance showing a large excess of exports over imports of **eggs**; whereas the United Kingdom, Germany, and Holland have an import many times as large as their export. The majority of eggs imported are, of course, those of domestic fowls, but the gathering of eggs from coasts and islands frequented by sea-birds, principally in northern seas, is an important source of livelihood in many places. It is so on the Shetland and Faroe Islands, on many parts of the Norwegian coast, on the islands of Texel and Sylt, in Holland. Here it may be mentioned that it is not merely for food that eggs are imported. They have various important uses in the arts. The white of egg (egg-albumen) is employed in book-binding and the finishing of fancy leathers; as a clarifying agent in sugar-refining and making wine; as a means of preparing one kind of photographic paper, and for other purposes. The yolk of egg is employed in making the finer kinds of tawed leather (**578**). The practice of preserving eggs by drying attained great importance during the war, but dried eggs have not yet been an important article of international trade. **Butter**, like eggs, is imported into the United Kingdom largely from adjacent countries—Denmark (supplying more than 40 per cent. of the total), France, and Holland; but cold storage has in recent years enabled us to receive enormous supplies from across the Atlantic, from Finland and remote parts of Siberia (**1013**), and even from the antipodes.[1] Holland supplies most of the imported **margarine,** which is made either from animal fats, vegetable fats (mostly from coco-nuts or the oil-palm), or a mixture of both, and flavoured with lactic acid ferments so as to be almost indistinguishable in taste from butter, for all but the best qualities of which it is now proving a keen rival. Good margarine is now said to be made also from cod, herring, and other fish oils. **Cheese** is still supplied more largely by Canada than any other country, but the diminishing supply from there is being made good by a growing supply from New Zealand. A cool summer climate is a favourable condition in the cheese-making districts of both (in Canada chiefly Quebec). Holland, Italy, and Switzerland furnish most of our European import.

490. Of animal products not used as food, the only ones of sufficient importance as mercantile commodities to be entered in the trade returns of the United Kingdom are bones, ivory, horns and hoofs, hair and bristles, feathers, sponges, tallow, isinglass, whalebone, and animal oils and wax, along with which it is convenient to treat of honey. **Bones** are employed in making a great variety of useful and fancy articles, and **bone-ash** is a common ingredient in the compositions used in the manufacture of pottery (**591**). Being in a great measure composed of phosphate of lime, bones are likewise largely employed in the making of manures (**571·11**). For manufacturing purposes they are chiefly imported from Brazil, the United States, and France; and for use as manure, chiefly from the East Indies and the Argentine Republic.

[1] In 1912–13 about 20 per cent. of our total butter import came from Australia and New Zealand, to which Siberia and Argentina added 15 per cent.

491. Ivory is the dentine or tooth-substance forming the tusks of elephants, hippopotamuses, walruses, narwhals, and other animals. **Elephant ivory** is distinguished by its lozenge-shaped curvilinear markings. **Hippopotamus ivory** is denser and harder than that of the elephant, and of a superior and more enduring whiteness, but the solid pieces of this kind of ivory are all small, so that it can be used only in making small articles—at most in making the handles of surgical instruments, for which it is highly prized. **Walrus ivory** is inferior to that of the hippopotamus, and that of the narwhal is coarse and of little value. The total annual consumption of ivory in Europe, the United States, British India, China, and Japan is estimated by Scherzer at about 1,100[1] tons, of the value of about £1,100,000. The largest share in the trade belongs to the United Kingdom, which imports about 500 tons annually. Of the total of 1,100 tons, about 1,000 tons are estimated to be derived from the elephant, **three-fourths** of this quantity being obtained from Africa, the remainder chiefly from the East Indies, though a small supply is regularly obtained from the remains of the Siberian mammoth, which have furnished ivory to China for seven centuries. Under the name of **vegetable ivory** a substance is imported into Great Britain to an amount two or three times as great as ivory proper; but this substance is not one-fifteenth of the value of true ivory, and is used for making buttons and toys. It is mainly the hard albumen of the seeds of a palm, *Phytelephas macrocarpa*, Ruiz & Pav., and the chief country of origin is Colombia.

492. Horns and Hoofs, which are principally employed in the making of combs, buttons, knife-handles, &c., are most largely imported from the British East Indies. (Comp. par. **572.**) **Horse-hair,** which is used in upholstery both as a stuffing and in the making of haircloth for the covering of furniture, is imported chiefly from Russia, Siberia (by way of China), and the Argentine Republic; cow-hair, now used principally in the making of felt for roofing and for clothing boilers and pipes of steam-engines, is brought into this country mainly from the European mainland. **Pig's-bristles,** the material chiefly used in the making of ordinary brushes, are supplied from abroad, chiefly by Germany, Russia, and China. Even the trade in **human hair** is not inconsiderable, though it does not appear in the 'Annual Statements' of British trade. France, Italy, and Germany are the countries that furnish the market with most of this article, and Marseilles is the chief centre of the trade. The annual value of the French import of human hair, which is not used merely by the hairdresser, but also in the making of bracelets, watch-chains, &c., approaches, if it does not exceed, £100,000. **Feathers** are classed under two heads—feathers for beds, and ornamental feathers. The former are imported into Britain from various countries, near and far, and include the soft down derived from the eider-duck, which is obtained chiefly from Iceland, but likewise from many northern cliffs haunted by sea-birds. Ornamental feathers are imported chiefly from France (the country which, next to Britain, has the largest trade in this article), Holland (which no doubt derives them originally from her possessions in the East), the British possessions in South Africa (where the ostrich has been domesticated for more than a hundred years), and the British East Indies.

493. Sponges consist of a horny internal skeleton of marine animals whose living portion consists of a coating of slime, which has to be removed before the sponge becomes an article of commerce. The animals yielding the best sponges live at a depth of only fifteen to twenty feet, and hence, when not covered by sea-weeds, can easily be seen from the surface.[2] The best sponges are all obtained from

[1] In later years much less. See *For. Off. Report*, Miscel. Series, No. 432, pp. 64–68.

[2] The sponges are generally obtained by divers, but a submarine vessel from which the fishers can seize the sponges by means of specially constructed tongs and deposit them in a basket on the bowsprit has been devised. An electric light with reflectors enables them to see the sponges through a glazed spy-hole.

the eastern half of the Mediterranean Sea, from the Gulf of Cabes in the east of Tunis to the coast of Syria. In this area is also included the Dalmatian coast of the Adriatic as a sponge-yielding region. The fisheries are carried on mainly by Greeks, Sicilians, Arabs, and Dalmatians, and it is the first-mentioned among whom the industry is best organised, and by whom the longest voyages are made in search of sponges. The headquarters of the Greeks are on the little island of Kalimno, which is situated in lat. 37° off the coast of Asia Minor. Outside of the Mediterranean, the only important source of sponges is the shores of the **Bahamas**, and the sponges obtained thence are all of the poorest quality.

494. Tallow and stearine, which latter is the harder ingredient in tallow, are most largely imported from the United States, the Australian colonies, and the cattle-rearing countries of South America. The former is used principally in the manufacture of soap (**601**), the latter in the making of candles. **Whalebone,** which is taken from the mouth of the Greenland and one or two other whales, and is a horny but flexible substance, now principally used as a stiffener for certain parts of women's dress, and even for this purpose much less than formerly, is imported indirectly from various countries (see **495**). **Isinglass,** which is the finest form of gelatine, and is largely used in confectionery and in the arts, as well as for clarifying wine and beer, is obtained from the sound or swim-bladder of various kinds of fish, and is imported into this country chiefly from the British East Indies, Brazil, and China. In Russia it is largely made from the sound of the sturgeon, and in the United States from other species of sturgeon which abound in many American rivers; but neither of these countries supplies much of this commodity to the United Kingdom. The thicker and less refined kinds of gelatine, including **glue** and **size,** do not enter largely into foreign commerce, but are made in large quantities from native and imported hides and bones by boiling. Even leather which is not made by tanning can be used in the manufacture of glue, but not tanned leather, for the chemical action of the tannin or tannic acid destroys the gelatine.

495. The most important of the **animal oils** of commerce are the produce of the **whale-** and **seal-fisheries,** included in British trade reports under the general designation of fish-oil, although neither seals nor whales are, properly speaking, fish. Of this oil there are two kinds. One, called **train oil,** is derived from the blubber or coat of fat which invests these animals under the skin. This kind is obtained principally from the **right** or **Greenland whale,** which is hunted in the seas off the west coast of Greenland, on the northern coasts of Norway, and in the Arctic Ocean generally to the north of Norway and Iceland, and from the **blubber seals,** which are captured by the northern whale-fishers in many places, but most abundantly off the coast of Labrador and in the Gulf of St. Lawrence. The northern whale fisheries showing signs of exhaustion, Norwegians and others are now actively prosecuting whale fisheries in the south Atlantic Ocean, both off the coast of South Africa and South America, especially round the Falkland Islands, and in the south Indian Ocean off Natal. The former Dundee whale and seal fisheries are almost, and those of Peterhead, quite extinct, and so also are those of New Bedford, Massachusetts, which died out after the opening up of the Pennsylvanian oil-field (**552**). The other kind of fish oil is that derived from the cachalot, or sperm whale, which contains immense quantities of oil in a cavity in its enormous head and in a tube which runs along its back. The **sperm-whale** being found in almost all parts of the ocean, this kind of oil is imported from many parts of the world, most abundantly from the United States and New Zealand (the latter the centre of the southern whale-fisheries), but also from Portugal, the Azores, Peru, and elsewhere. Train oil is used principally in soap-boiling (**601**), but sperm oil, a finer and more valuable kind, yields in cold weather a kind of waxy body called **spermaceti,** which, mixed with a little beeswax, is used in the making of candles (par. **556**), and by itself in the making of cold cream, salves, &c. A finer kind of train oil than that derived from the right whale is now obtained in greater and

greater quantity from the **bottle-nosed whale** (*Hyperoodon rostratus*), the hunting of which has begun to be pursued pretty actively from the north-east of Iceland as a centre. Neither the cachalot nor the bottle-nose whale furnishes whalebone, but the former yields besides oil another valuable product, namely the substance called **ambergris**, which is largely used in perfumery, and is sometimes found in the body of the animal, sometimes floating on the surface of the water. It is a result of disease. Of true fish oils, the most important is **cod-liver oil**, which is largely made in Great Britain, as well as in Newfoundland and Norway, from the products of the great cod-fisheries of these countries. A true fish oil is likewise made from the **menhaden**, a species of Alosa, which is caught in immense quantities off the eastern coast of the United States, from Connecticut to Virginia, above all in the neighbourhood of New York. The oil is chiefly used in leather-dressing, but also in rope-making and painting. Other animal oils are derived from tallow, lard, bone-fat, &c., and are imported into this country mainly from the United States. From the **dugong** (**496, 572**), a kind of oil capable of being used for the same purpose as cod-liver oil, as well as in cooking, is largely extracted in Queensland.

496. The following are among the animal products which, though of considerable commercial value, either do not enter into the foreign commerce of the British Isles at all, or not to a sufficient amount to be separately enumerated in the trade returns. **Coral** is the name given to the skeleton of a whole group of marine animals; but the red or pink coral, the skeleton of *Corallium rubrum*, is the only one of great value in commerce, its value being due to its use in the making of trinkets and other ornaments. **The coral industry is specially an Italian one,** and its chief seat is Torre del Greco, at the base of Mount Vesuvius, in the Bay of Naples, Formerly the chief supplies of coral were obtained by diving in the Bay of Naples, as many as five hundred boats having often set out from Torre del Greco to carry on this fishery. The coral banks both in this bay and in the south of Sardinia, which are also within easy reach of the Torre del Greco fishermen, are being rapidly exhausted, and the fishermen are hence deserting them for those on the coasts of Algeria, Tunis, and Tripoli, which are now more profitable. **Coral** is also obtained on the coast of Catalonia, round the Cape Verde Islands, in the Adriatic, especially on the east coast, and in other places. Besides the product of its own fisheries Italy imports large quantities of unworked coral, and exports not only coral ornaments, but also the raw material in a partially worked condition. A considerable quantity of coral is exported directly or indirectly to China, where it is used in the official dress of the mandarins. **Pearls and mother-of-pearl** are derived from various shells, especially of the oyster family, belonging principally to tropical seas. The mother-of-pearl is the internal part of the shell, and pearls are secretions of the same kind of matter round some small parasite or particle of inanimate foreign matter which acts as an irritant. Among the most noted pearl-fishery banks are those in the Persian Gulf, in the Gulf of Manar (Ceylon), in the Sulu Archipelago, in the neighbourhood of the Moluccas and the Aru Islands, in Torres Strait, and on the north-west coast of Australia, at Tahiti, and in the Gulf of California. Pearls are also obtained from various river-shells, especially the *Unio margaritifera*, which is met with in many European rivers, including some of those of Scotland and the north of Ireland. **Charqui, or jerked beef**—that is, beef cut into strips, salted, and dried in the sun—is much used as food in the southern states of South America, where it is an article of trade of no little value. In Norway a new kind of '**corned beef**' is now made **from the flesh of the whale** both for home consumption and for export. **Dugong bacon** is among the preserved meats which are exported from Queensland. **Parchment**, the skin of sheep, and **vellum**, that of calf, prepared for writing on, no longer have the value that belonged to them before the invention of paper, but are still manufactured for use in formal documents and in book-binding. The so-called **catgut** consists of the dried and twisted intestines of sheep and other animals. It is used in making the strings of musical instruments, racket-cords, and cords used by clock-makers, polishers, &c. The intestines of

larger animals serve to make **gold-beater's skin.** **Fresh milk** is, of course, only an article of local trade; but **condensed milk**, made by adding sugar, or some other ingredients with or without sugar, to the milk, and then evaporating the milk to a greater or less extent, is exported from the Netherlands, Belgium, France, Norway and other countries, and milk is also now largely prepared and exported in the form of a powder. **Ghī**, or butter clarified by boiling, is an article of commerce in India and neighbouring countries. **Koumiss**, the fermented milk of mares, is a favourite drink among certain nomadic tribes in central Asia, and is now largely made in Russia also, on account of its being esteemed a remedy for consumption. An imitation koumiss is now made for the same use in other countries from asses' and cows' milk. The **nests** of a certain kind of swift (*Collocalia esculenta*), which breeds in caves at various places in the Eastern Archipelago, are looked upon as a luxury in China, where they are imported in millions annually. The nature of the nest has long been a subject of dispute, but the best observers seem to be still agreed that those nests at least which are most valued as food (which are always white) are entirely made from a peculiar saliva secreted by the bird, as was asserted more than a hundred years ago.

497. The **wax** of commerce is both of animal and vegetable origin. The greater part of it is still, no doubt, bees' wax, though the commercial supplies of other kinds of wax are increasing. **Bees' wax** is a product of almost all parts of the world. In Europe, **Germany** and **France** are the countries in which bee-keeping is most general, but so large is the consumption both of honey and wax in those countries that the import of both these commodities is considerably greater than the export. **Italy**, which consumes so much wax in connection with the ceremonies of the Roman Catholic Church, **imports** from six to ten times as much wax as she exports, but has an excess of exports in the case of honey. Altogether Europe produces much less honey, as well as wax, than is consumed there. The deficiency in **honey**, and part of that in wax, is made up chiefly by the produce of American bees, this being another case in which Europe is indebted to America for surplus supplies of products originally introduced from Europe, for the honey-bee was not known in the New World before it was introduced by the Spaniards into Mexico.

498. The **European supplies of wax** are brought from more various sources than those of honey. Bees' wax is imported into this country more largely from Germany and the United States than any other countries, but there is also a large import of **Japanese and Brazilian waxes**, which are mainly, if not wholly, of **vegetable origin**. The **Japanese wax** is derived from the seeds of a **species of Rhus** (*R. succedanea*, Linn.), a tree which also grows in China and India; the **Brazilian** is found chiefly in the form of a glutinous powder on the leaves of a kind of palm known as the **carnauba**, or wax palm (*Copernicia cerifera*, Mart.). This last kind of wax is too hard and has too high a melting point to be used by itself in making candles; and another vegetable substance, known as **myrtle wax**, the product of a North American shrub (*Myrica cerifera*, Linn.), is too soft and has too low a melting-point to be so used; but both are employed to mix with other candle-making materials, and the former is used in making varnishes. The lofty **wax-palm of the Andes** (*Ceroxylon andicola*, Humb. & Bonfil) has the wax as a coating on the trunk, and various other trees (in Brazil and elsewhere) yield a kind of wax which is locally used for candle-making and other purposes, but is of little importance in commerce; and others again, such as the *Stillingia sebifera*, Willd., a Chinese tree introduced into both the East and West Indies, yield a kind of vegetable **tallow** which is mixed with wax in candle-making. Of more importance than any of these last-mentioned substances is the so-called **insect white wax of China**, which is one of the most important of all articles of trade within that empire, though its high price does not admit of its being exported in any great quantity. This wax is produced in the south-west of the country, and is formed as a coating on the twigs of one kind of tree, through the action of an insect which is bred upon another kind of tree in a different part of the

province, and transferred by carriers to the wax-tree when the insect is at the stage for commencing operations on the latter. The wax is excellent for candle-making.

499. The **lac** of commerce (often called gum-lac), which is the **principal ingredient in sealing-wax,** is, like the last-mentioned substance, the result of the action of an insect (*Coccus lacca,* Linn.) on the branches of a tree (in India, the principal source of supply of this commodity, generally the *Butea frondosa,* Roxb., or the *Ficus religiosa,* Linn.). **The lac is a kind of resin** derived from the sap of the trees to which the insect attaches itself, but modified in its properties by passing through the body of the insect itself. It appears in commerce in various forms and under various names. The twigs encrusted with the substance form the **stick-lac** of commerce. The substance is then freed from the wood and repeatedly washed, after which it appears in the form of grains, forming the **seed-lac** of commerce ; and this, being melted, is re-consolidated into thin flakes, which are known in commerce as **shell-lac.** Sometimes it appears in another form, and especially in the case of the coarser qualities used for home consumption. The seed-lac after being melted is allowed to drop into rounded pieces an inch or more in diameter, forming what is called **button-lac.** In the course of the washings above referred to, a red substance originally formed in the body of the insect is separated from the insect, and this, being made into cakes and dried, forms **lake-lac** or **lac-dye.**

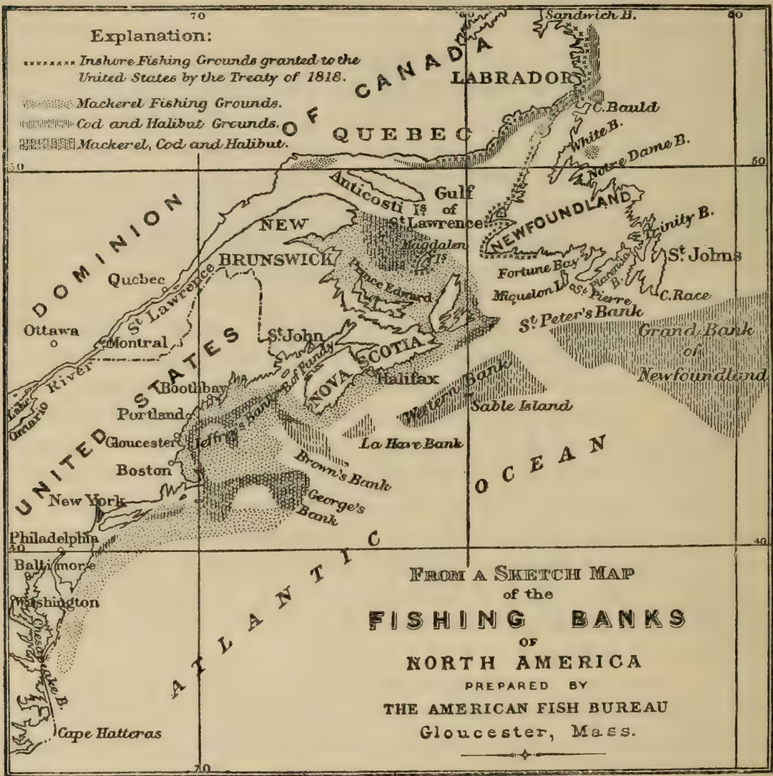
COMMODITIES (*continued*)

II. Fisheries

500. Under the head of fisheries we include the commercial production not only of all kinds of fish but also of other marine animals used as food. In this sense the fisheries of the United States and the United Kingdom appear to be the most valuable in the world, the value of the products of the fisheries in each of these countries about 1900 having been above £9,000,000. In the United States, however, the value of the oysters was not far short of one-fourth of the total, while in the United Kingdom the corresponding value was comparatively small. The annual value of the fisheries of Canada increased from less than £3,000,000 in 1880 to upwards of £4,000,000 in 1900; and Newfoundland (including Labrador) adds upwards of £1,000,000 annually to the value of the fisheries of British North America. In Europe the fisheries next in importance to those of the United Kingdom are those of Russia, France, and Norway. The value of the French fisheries exceeds £5,000,000, that of the Norwegian £1,000,000 annually; but in the case of France this includes the produce of the French fisheries on the coasts of Newfoundland and Iceland. In Asia, the most valuable fisheries, so far as statistical data enable us to say, appear to be those of Japan, the produce of which is estimated to exceed in value that of any European country except the United Kingdom.

The sketch-map on the next page shows what have long been the most valuable fishing-grounds in the world. These consist of a chain of submerged ocean plateaux elevated considerably above the bottom of the surrounding sea, and they very quickly attracted the attention of the early explorers who visited America. This was in the beginning of the sixteenth century, when all Europe was still Roman Catholic and enormous quantities of fish were consumed in the many Church fasts. The discovery of these rich fishing-grounds hence 'created the most profound sensation, and kings, noblemen, and wealthy merchants engaged in and fostered the enterprise of fishing with a zeal that we may now find difficult to realise or appreciate.' The French fishermen were the pioneers in the cod-fisheries, and it is said to be fairly certain that as early as 1504 the Normans and Biscayans knew of the Newfoundland fisheries. At the present day the coast-line bordering the seas in which these fishing-grounds lie belong to Newfoundland (including Labrador), the Canadian Dominion (provinces of Nova Scotia,

New Brunswick, Prince Edward Island, and Quebec), the United States, and the two small French islands of St. Pierre and Miquélon. The fisheries on the banks in the open sea are free to all, but the rights of 'inshore' fishing are limited by treaty. The treaty at present regulating the rights of United States fishermen in British waters and those of Canadian and Newfoundland fishermen in United States waters is the Treaty of London of 1818,[1] according to which the waters within



three miles of the coast are reserved for the fishermen of the country to which the coast belongs, except along the coasts indicated by crosses on the accompanying sketch-map. French fishermen are allowed to fish on all the coasts of Newfoundland from Cape St. John (lat. 50° N. on the east coast) round the northern peninsula of the island, and as far as Cape Ray, at the southern end of the west coast. The other rights enjoyed by the French under the treaty of Utrecht were renounced under a convention concluded in 1904.

501. Nearly half the value of the fishery products of the United

[1] As interpreted by the Arbitration Tribunal at The Hague in 1910.

States, exclusive of oysters, is furnished by the New England States, and among these, chiefly by Massachusetts and Maine. The principal fish caught are cod, mackerel, hake, herring, and tile-fish (*Lopholatilus chamæleonticeps*). The last mentioned, which attains a length of over 3 feet, was first caught in 1879, shortly afterwards was destroyed in immense numbers apparently through the warm Gulf Stream waters on the so-called Gulf Stream Slope giving place to cold water issuing from the Gulf of St. Lawrence, but has again been caught to the amount of millions of pounds annually since about 1915. Two species of Alosa are likewise caught in large numbers. One of these is the menhaden (**495**); the other is known as the alewife, and is caught most abundantly in the waters of North Carolina. It somewhat resembles the shad, and is used as food.

On the Pacific Coast the great speciality of the fishing industry is the catching of salmon for export in tins (salmon-canning). It is chiefly pursued on the Columbia River (Oregon), the Sacramento (California), on the Fraser, Skeena, and Naas Rivers, besides several inlets in British Columbia, and in recent years above all in the rivers and creeks of Alaska. Next to the salmon fisheries those of cod and halibut are the most important on this coast, exclusive of the seal-fisheries (**486**).

The chief products of the lake fisheries are whitefish, trout, 'herring,' and sturgeon; the whitefish and herring being both species of Coregonus. Of these the whitefish are the most valuable, not only as regards the amount caught, but also in respect of quality. Throughout the United States and Canada they are esteemed a peculiar delicacy, and large quantities are transmitted fresh to distant markets in refrigerating trucks. The oyster-fisheries of the United States are of very great value. They are chiefly carried on in Chesapeake Bay, Maryland and Virginia being the states most largely concerned in the industry, and Baltimore the centre of the trade. (See **222.**)

The Canadian fisheries yield principally cod, lobsters, herring, and mackerel, besides salmon, these last being mainly produced in British Columbia. Nova Scotia and New Brunswick are the leading provinces in this industry, the former producing annually nearly one-half of the total value, the latter one-fifth or more. In Newfoundland the production of cod is far in excess of that of any other fish.

502. The fisheries of the United Kingdom employ above 125,000 men, who before the war landed at British ports upwards of 1,200,000 tons of fish.[1] A large proportion of the fish caught, however, are obtained from distant waters extending from the Barents Sea, north of Lapland, and the White Sea to the north-west of Morocco.[2] The

[1] Of which in 1913 above 600,000 tons were herring, nearly 200,000 tons cod, and 112,000 haddock.

[2] See the map accompanying Prof. Stanley Gardiner's paper on 'The Geography of British Fisheries,' in the *Geog. Journ.*, vol. xlv., pp. 472–96.

fisheries are pursued chiefly from ports in Great Britain. Not only is the value of the fish caught in Irish waters relatively small, but a large proportion of the catch is made by English, Scotch, and foreign fishermen. The principal reasons for this state of things are these. The waters of the North Sea are much richer in food-fishes than the other waters of the British Isles. It is a natural consequence of this that the six leading fishery stations, Billingsgate, Grimsby, Hull, Aberdeen, Yarmouth, and Lowestoft, the only ones at which more than 50,000 tons a year are landed, are all on the east coast. Further the principal Irish fishing banks are off stormy parts of an iron-bound coast in the north-west and south-west; the Irish fishermen are mainly peasants, who make use of small boats fitted only to take advantage of brief spells of fair weather; the chief markets for fresh fish are in Great Britain, and accordingly not accessible by railway [1]; the Irish railways do not extend to certain places where fish might otherwise be advantageously landed; and, finally, there are in Ireland no proper fish-curing establishments.

503. The English fisheries are more miscellaneous than those of Scotch waters, herrings and mackerel among those caught near the surface, and soles, haddocks, cod, and turbot among the demersal or bottom-frequenting fish, all having a high place in the list of products of the fisheries of England, whereas in those of Scotland the herring-fisheries are without a rival, those of haddock and cod coming next. Pilchards, which are the mature form of the true sardine, are a speciality of the Cornish coasts. Oysters are largely produced at Whitstable on the north coast of Kent, on the Essex coast, and on the coast of the Isle of Wight. Besides the fishing ports above mentioned North Shields, Milford, and Fleetwood are important in England, and in Scotland Wick, Lerwick, Fraserburgh, and Peterhead. Aberdeen is the greatest trawling centre north of the Humber.

504. The principal Norwegian fisheries are those of cod and herring, the cod-fisheries being carried on chiefly on shallow banks round the Lofoten Isles (**930**), the herring-fisheries mainly in the neighbourhood of Bergen.

505. In the fisheries of France, sardines and anchovies, and also oysters, are of special importance. The sardine and anchovy fisheries are carried on mainly on the Mediterranean coasts, the sardines of Provence being esteemed the best. The great market for the Provence fisheries is Beaucaire on the Rhone, east of Nîmes. On the Atlantic side the great seats of sardine-packing are Bordeaux and Le Mans. Sardines and anchovies are likewise caught and prepared for export on the coasts of Spain, Portugal, and Italy; but it must be mentioned that a kind of sprat is often prepared like the sardine and sold under

[1] Special fast trains are essential to the carriage of this very perishable commodity. Successful experiments have been made in the carriage of live fish by rail from Tréport (near Dieppe) to Paris.

that name. Oysters are produced mainly on the coasts of Brittany, and other parts of the Atlantic coast farther south. Since about 1856 artificial oyster-breeding has been pursued in France with great success, chiefly in the basin of Arcachon (to the south of the Gironde), and in the bay of Morbihan (on the south coast of Brittany).

506. Besides the sardine and anchovy the only important food-fish of the Mediterranean waters is the tunny. This fish (*Scomber thynnus*) is a gigantic congener of the mackerel (*Scomber scomber*). It attains a length of as much as twelve or thirteen feet, and a weight of 1,000 to 1,200 lbs., and it appears in immense shoals in the beginning of summer, especially on the coasts of Sicily, Sardinia, and southern France. The fishery is carried on chiefly on the coasts of Sicily and Sardinia, which are visited by thousands of native and foreign fishermen during the fishing season.

507. In Russia the river fisheries and those of the Caspian Sea are of great value in consequence of the abundance of the sturgeon in these waters. Caviare, or the roe of the sturgeon prepared as a condiment, is by far the most important fishery product exported from that country.

508. Of the fisheries in Asiatic and Australian waters the only ones that need be mentioned are the fisheries of Japan, and those for trepang in tropical seas. Sardines, herrings, and bonitos, the last a large fish of the same genus as the tunny, are the principal products of the Japanese fisheries, but the waters surrounding the island of Yezo in the north of Japan abound also in salmon, cod, and other food-fishes, the catching of which forms the principal industry of the inhabitants. Trepang, also known in commerce by the French name of *bêche de mer*, is a kind of sea-cucumber, which is a favourite article of food with the Chinese, and is extensively fished for the Chinese market on all the coasts of the Eastern Archipelago, on those of New Guinea and northern Australia, and round many of the tropical islands of the Pacific. It is likewise exported from China to distant countries in which Chinese are settled (California, &c.).

509. The foreign commerce in fish is by no means proportioned to the productiveness of the fisheries, most kinds of fish being produced mainly for markets near at hand. The fish exports of the British Isles (chiefly herrings to the Baltic, above all Germany and Russia[1]) are about balanced by the imports, so that the value of the production of fish on the British coasts is almost equivalent to the home consumption. The value of the export from the United States is equal to perhaps one-seventh of the total production, by far the largest item being **canned salmon,** which is sent chiefly to the United Kingdom and Australasia. Dried and **cured cod** and other fish come next in importance, these being sent mainly to the West Indies, South America, and Germany.

[1] Nearly five-sixths of the herrings landed at British ports in 1913 were exported; hence the serious loss of markets through the war.

About one-third of the produce of the Canadian fisheries is exported, chiefly to the United States. Newfoundland and Norway are the two countries which export the greater part of the produce of their fisheries. From Norway are exported both herrings and dried and cured codfish. The herrings are sent chiefly to the Baltic, but the **great markets** for the latter are the same as those for the dried and cured codfish which make up the bulk of the export from Newfoundland, namely **Spain, Portugal,** and **Italy,** Roman Catholic countries in which there is still a very large consumption of fish. St. John's in Newfoundland and Bergen in Norway are the centres of this trade. Bergen has the advantage over St. John's of being about 360 nautical miles nearer the Straits of Gibraltar ; but, on the other hand, it is at a greater distance from the chief fishing-ground. A small quantity of dried codfish is also exported from Nova Scotia to the same markets, but Halifax in Nova Scotia is under the disadvantage, in respect of this trade, of being about 500 nautical miles farther than St. John's from the seaports of southern Europe.

The deep sea fisheries of Germany have been growing rapidly since the last decade of last century, largely in consequence of state encouragement in the provision of fishery harbours, such as those of Geestemünde, Norderney and Altona, in the freeing of fishing-boats from harbour and pilotage dues, and in other ways.

COMMODITIES (*continued*)

III. Mineral Products

510. COAL. Coal consists of vegetable matter which has been buried and sealed up out of contact with the air in past ages, and has then undergone a series of slow chemical changes, the general result of which is to get rid of a large proportion of hydrogen and oxygen, and to increase the relative proportion of carbon in the remaining substance. In pure woody fibre the proportion of carbon present is little more than half, whereas in ordinary **bituminous coal** it may amount to from 85 to upwards of 88 per cent. The substance known as **lignite**, or brown coal, consists of vegetable matter much less altered than in ordinary coal, and contains a smaller relative amount of carbon, say 70 per cent. In certain situations, the process of removing hydrogen and oxygen has gone further than in the formation of bituminous coal, and as much as 94 per cent. of carbon may be present. There is then formed a kind of coal called **anthracite**, which is lustrous on the surface, does not soil the fingers, is difficult to light, burns with little or no flame, but produces an intense heat when it does burn. **Coke**, an artificial product made by heating bituminous coal in closed vessels or ovens, and removing the more volatile constituents, contains as high a proportion of carbon as anthracite, but the product acquires in the process a highly porous or vesicular structure along with hardness and density. It is these properties that make it so valuable in the blast furnace, its hardness enabling it to resist crushing by pressure, and its porosity presenting a greater amount of surface to the action of heated air. The removal of the more volatile constituents is sometimes effected directly by burning, either in what are called beehive ovens, but now more and more in a kind of retort which allows of the gases being deprived of tar, benzene, ammonia, and other valuable by-products. The beehive ovens produce a coke in some respects better in quality, but besides involving the loss of the by-products consume more coal in producing the coke, and the balance of advantages is thus proving in favour of the retort ovens, which have for some time been those chiefly used on the mainland of Europe.[1]

[1] According to the British census of production (1907) there were in that year nearly 27,000 coke-ovens not yielding by-products against 5,200 of other types. The quantity of coal required on the average to produce a ton of coke in the United Kingdom in the same year was 1·64 tons, while in Germany in 1910 the corresponding quantity in the coke-ovens supplied by the Westphalian Coal Syndicate was only about 1·28 tons.

Only certain kinds of coal are suitable for the making of coke, the best being those which fuse readily into a mass in burning.

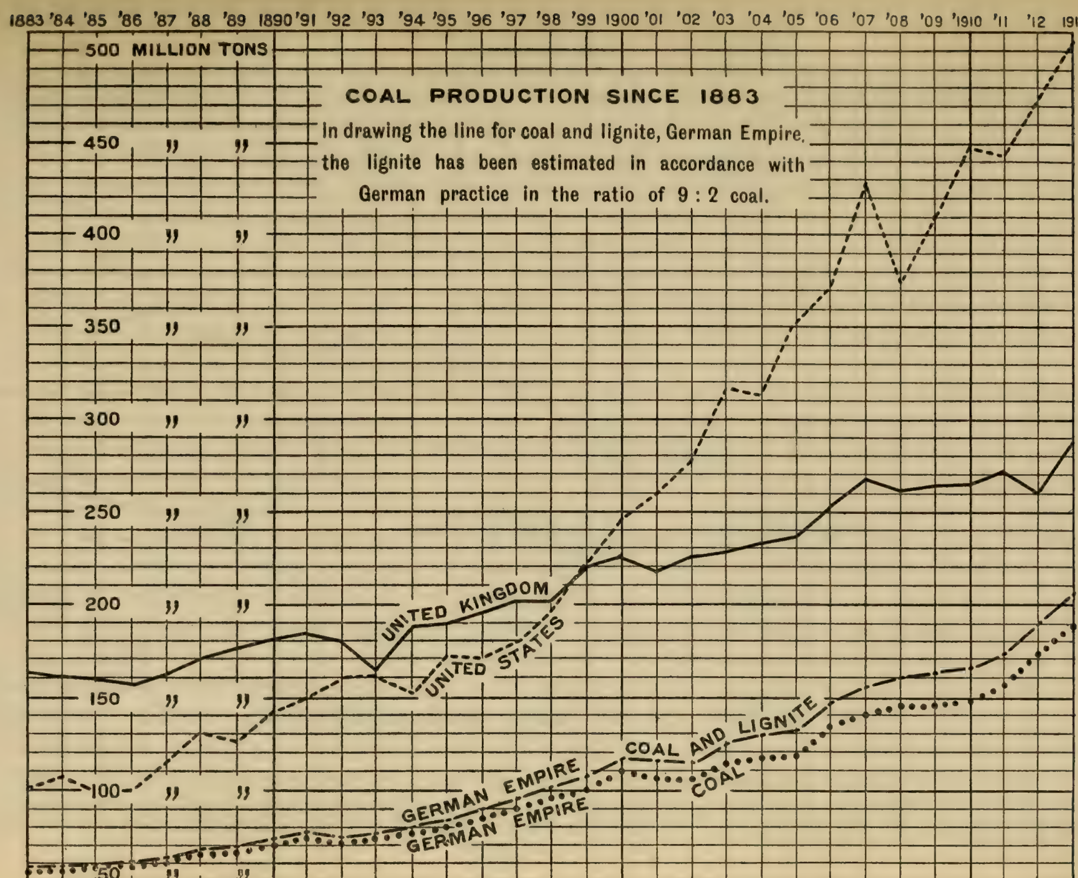
511. Coal was little known even in England a thousand years ago. It is indeed certain that it was worked at several places in Roman Britain, but it seems to have been little used in Anglo-Saxon times. The first proper coal-mines are, however, said to have been opened almost at the close of that century (1198) in Belgium, and it is long before we hear of a trade in Newcastle coal. In 1615 that trade had nevertheless attained considerable magnitude. It is then said to have employed four hundred vessels in distributing coal over England, about half of that number being engaged in supplying London alone. In 1660 the total coal production of England is estimated at less than two and a quarter million tons, which, according to the estimate formed of the population of England and Wales at that time (about 5,500,000), is equal to about two-fifths of a ton per head.

512. The vast increase in the use of coal in recent years has been due chiefly to the requirements of modern factories, of railways and steamers, of blast furnaces, gasworks, and electrical installations. At the beginning of the nineteenth century, after the invention of the steam-engine and its application to spinning machinery, but before the invention of steamboats, and still longer before the introduction of railways, and before coal gas came into general use for lighting, the production of coal in England is estimated to have been ten million tons, equal to about five-eighths of a ton per head for the estimated population of the United Kingdom. The differences under these heads at the end of the nineteenth century are shown in the accompanying diagrams, which afford a comparison with the two other leading coal-producing countries of the world, and the tables on p. 236 extend this comparison.

513. The last Royal Commission on coal supplies gave as approximately correct figures showing the total consumption of coal in the United Kingdom in 1903,[1] and these, together with official figures for the same year obtained elsewhere, have made it possible to draw up the table on p. 237 in percentages, which it is interesting to compare with more or less corresponding figures for Germany in 1913 and the United States in 1915, taken from or based on those given in W. A. Bone's *Coal and its Scientific Uses* (pp. 478, 479). The particulars have been so arranged as to make the data as nearly as possible comparable with one another.

So far as these figures correspond with one another the most striking differences are under the heads of export, railways, and bunker coal, and are significant of geographical differences between the three countries. Under the head of coal export it is possible to convert the figure given for the United Kingdom for 1903 to that for the same

[1] Final Report of the Royal Commission on Coal Supplies [Cd. 2353], 1905, p. 11.



COAL PRODUCTION SINCE 1883
In drawing the line for coal and lignite, German Empire, the lignite has been estimated in accordance with German practice in the ratio of 9 : 2 coal.
1883 '84 '85 '86 '87 '88 '89 1890 '91 '92 '93 '94 '95 '96 '97 '98 '99 1900 '01 '02 '03 '04 '05 '06 '07 '08 '09 '1910 '11 '12 1913
500 MILLION TONS
450 " "
400 " "
350 " "
300 " "
250 " "
200 " "
150 " "
100 " "
50 " "
UNITED KINGDOM
UNITED STATES
GERMAN EMPIRE COAL AND LIGNITE
GERMAN EMPIRE COAL

Diagram I.

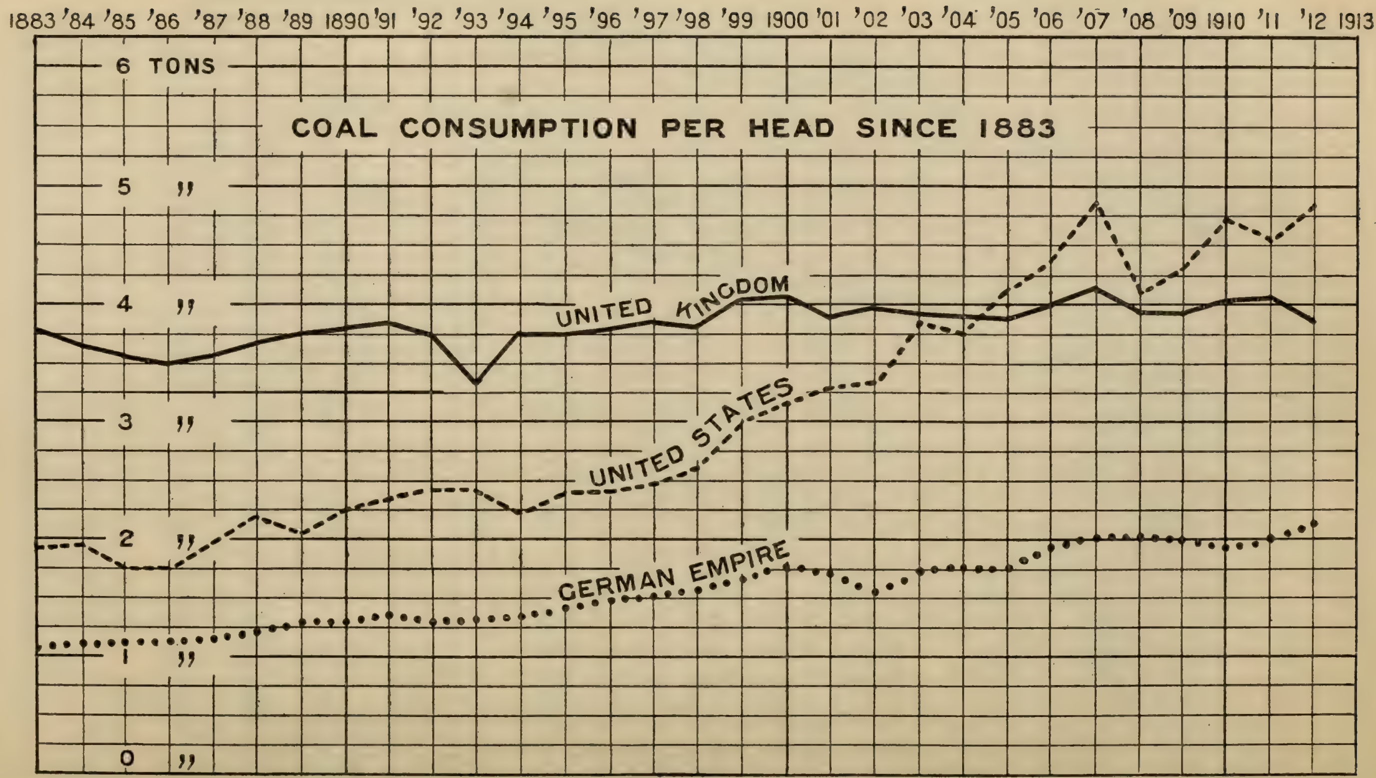

COAL CONSUMPTION PER HEAD SINCE 1883
1883 '84 '85 '86 '87 '88 '89 1890 '91 '92 '93 '94 '95 '96 '97 '98 '99 1900 '01 '02 '03 '04 '05 '06 '07 '08 '09 1910 '11 '12 1913
6 TONS
5 "
4 "
3 "
2 "
1 "
0 "
UNITED KINGDOM
UNITED STATES
GERMAN EMPIRE

DIAGRAM II.

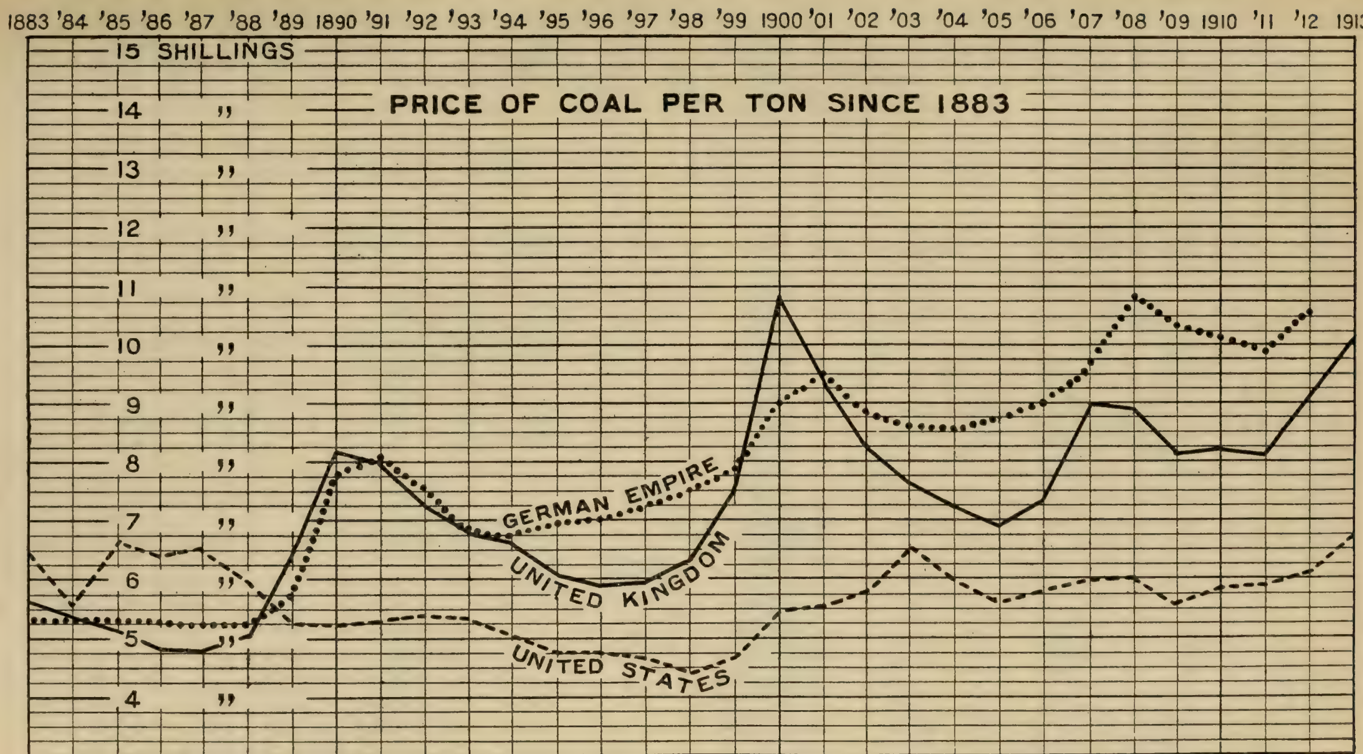

PRICE OF COAL PER TON SINCE 1883
1883 '84 '85 '86 '87 '88 '89 1890 '91 '92 '93 '94 '95 '96 '97 '98 '99 1900 '01 '02 '03 '04 '05 '06 '07 '08 '09 1910 '11 '12 1913
15 SHILLINGS
14 ,,
13 ,,
12 ,,
11 ,,
10 ,,
9 ,,
8 ,,
7 ,,
6 ,,
5 ,,
4 ,,
GERMAN EMPIRE
UNITED KINGDOM
UNITED STATES

DIAGRAM III.

Country	Estimated Reserves[1] Thous. Mlns. of Tons		Average Annual Production in Mlns. of Tons [2]			Consumption. Tons per Head 1906–10
	Actual	Probable & possible	1881–5	1896–00	1906–10	
United Kingdom	139·0	47·0	158·9	209·0	261·7	4·04
Australia	2·0	128·0	2·5	5·4	9·3	1·42
Canada	29·4	252·0	1·6	4·0	9·7	2·59
India	0·2	75·0	1·2	4·8	11·5	0·04
New Zealand	0·4	0·5	0·4	0·9	1·9	2·09
Union of S. Africa	—	55·0	—	—	5·2	0·85
Austria-Hungary	2·9	37·0	7·7	11·8	14·8	0·49
Belgium	—	10·8	17·3	21·7	23·3	3·10
China [3]	18·4	961·0	—	—	—	—
France	4·1	11·6	19·4	30·7	35·6	1·34
Germany	93·0	310·0	53·6	95·2	142·6	2·00
Japan	0·9	6·2	1·1	6·2	14·3	0·19
Russia	0·06	57·0	3·8	12·4	24·6	0·18
Spain	5·7	2·1	1·0	2·3	3·6	0·31
United States	1943		95·5	202·8	405·9	4·43

[1] From the preface to the *Coal Resources of the World*, a report presented to the Twelfth International Geological Congress, Toronto, 1913.

[2] The coal production of the world decreased from 1320 million tons in 1913 to 1152 in 1919; that of the United Kingdom from 287 to 233 million tons, while that of the United States increased from 509 million tons in 1913 to 611 millions in 1918, though in consequence of a strike it decreased in 1919 to 486 millions.

[3] See **1113**.

Country	Value per ton		Tons produced per head of population	Thousands of persons employed above and below ground [1]	Tons produced per person employed	Millions of tons imported	Millions of tons exported
	s.	*d.*	Annual Average, 1906 to 1910				
United Kingdom	8	$3\frac{3}{4}$	5·93	953	275	0·04	83·57
Australia	7	$1\frac{1}{4}$	2·21	20	462	0·07	3·39
Canada	10	$6\frac{1}{2}$	1·50	22	439	8·82	1·69
India	4	$6\frac{3}{4}$	—	115	100	0·37	0·78
New Zealand	10	$8\frac{3}{4}$	2·02	4	470	0·24	0·17
Union of S. Africa	6	9	—	20	265	*0·07*[2]	*1·32*[2]
Austria-Hungary	8	$5\frac{1}{4}$	0·30	72	188	10·54	1·24
Belgium	12	$6\frac{1}{4}$	3·16	143	163	6·34	6·80
France	12	3	0·91	185	192	18·79	1·58
Germany	10	$0\frac{1}{4}$	2·26	576	247	12·59	28·68
Japan	8	$6\frac{1}{2}$	0·29	130	109	0·08	4·86
Russia	10	$4\frac{1}{2}$	0·15	163	151	4·53	0·12
Spain	10	$8\frac{1}{2}$	0·19	24	150	2·43	0·003
Sweden	8	$11\frac{4}{5}$	0·05	2	142	4·44	0·001
United States	5	10	4·56	681	596	1·83	12·85

[1] The proportion of underground workers varies in different countries from about 66 to 80 per cent.

[2] For 1910 only.

year as the German figures, 1913. The British export of coal had long been expanding before the war at a more rapid rate than the production, and in 1913 the coal[1] exported from the United Kingdom was 26·7 per cent. of the total production in that year, involving of course a corresponding aggregate reduction in the other percentages. This heading is one indication of the same geographical advantage as is revealed also by the high proportion of bunker coal used in the United Kingdom, while the high proportion of coal used on the railways, especially in the United States, is equally significant of the enormous internal land trade in that country. Bone in the work already quoted enables us to make the iron and steel figures correspond in respect

United Kingdom		Germany		United States	
Domestic	13·8	Domestic	9·1	Domestic and small steam purposes	22·0
		Briquetting plants	3·5		
		Coke ovens	23·4		11·6
Iron and steel industries	12·1		—		—
Other metal and mineral industries	0·4		—		—
Electric power production	—	Public purposes	2·9		—
		Industrial	10·0		—
Factories	22·9	Factories	14·1	Factories	33·0
Brick works, potteries, glass and chemical works	2·2		—		—
Agriculture	—	Agriculture	4·0	Agriculture	—
Mines	7·8	Mines	—	Mines	1·9
Railways	5·6	Railways	9·3	Railways	24·0
Bunker coal, external trade	7·4	Navigation	5·3	Bunker coal	2·1
Do., coasting trade	0·9		—		—
Gas	6·5	Gas	5·3	Gas	0·9
Export	20·4	Export	13·1	Export	4·5

of the year with the German figures. Taking 25 cwts. of coke as required on the average to produce one ton of pig iron, and that amount as demanding the consumption of $37\frac{1}{2}$ cwts. of coal, he estimates (p. 390) that the 10·48 million tons of pig iron produced in 1913 would use 19·65 million tons of coal = 6·8 per cent. of the total production. This may be taken as at least roughly answering to the 23·4 per cent. used in German coke-ovens. He estimates the total amount of coal consumed in all branches of the iron and steel industry in that year at not much less than 30 million tons, or about one-half more than the amount consumed in the smelting branch only. Increasing the German and United States coke-ovens production in the same ratio, we get 35·1 and 17·4 per cent. respectively for the consumption in these countries in every branch of the iron industry. This would involve a corresponding reduction of the consumption ratio for industrial purposes in the two countries to make the figures roughly

[1] Inclusive of coke, cinders, and patent fuel.

comparable with the sum of the second, third, and fourth items of the British consumption, the total of which in 1913, on the assumption of a reduction for these in the same ratio as the aggregate exclusive of the export, would be 24·1 per cent.

514. There have been many speculations as to the future of the coal supply of the world as a whole and of particular countries. The vast extent and content of the known coalfields of the world as shown in the first column of the first of the two tables given on p. 236 removes, indeed, any fear of the using up of the coal-supply of the world to the remote future. With regard to the coal-supply of any particular country [1] or region, however, it must be borne in mind that so far as the prosperity of such country or region depends on cheap coal, that prosperity will be more or less affected as soon as the price of coal begins to rise relatively to the price in other countries or regions. As to the future of the coal production where large deposits of coal still remain to be utilised, it is impossible to prophesy; the conditions which determine whether a coalfield is worked or not are too numerous and uncertain. Much depends upon the quality of the coal, the situation of the coalfield, the ease with which the region can be supplied with coal from elsewhere, or with power from other sources, and much also on the habits of the people. As falling water is now so important a competing source of power it should be mentioned here that where there is plant for the continuous development of power by this means one British horse-power hour, = 550 foot-pounds = 746 watts, is equivalent to the consumption of 2 lbs. of coal. With continuous working, therefore, on 300 days in the year, a horse-power year would be equivalent to the consumption of nearly 6 tons in that time. A horse-power year is very commonly taken as equal to 10 tons of coal.

515. With respect to the immediate future, the diagrams on pp. 233–235 afford the means of forming a reasonable anticipation in so far as they indicate the tendencies of recent years. Our first diagram shows that both our two chief rivals in manufactures are rich in at least one of the great sources of power, and that in both countries the production of that source of power has been increasing more rapidly than at home, and the second diagram shows that the consumption

[1] The second Royal Commission on the Coal Supplies of the United Kingdom estimated the total quantity of available coal as follows (see 78):

	Millions of Tons
Above 4,000 feet below the surface in proved coalfields . .	100,915
,, ,, ,, in unproved coalfields .	39,483
Below 4,000 feet in proved coalfields	5,239
	145,637
Under the sea off the coast of Cumberland, 5–12 miles beyond high-water mark	855
Under the sea St. Bride's Bay and Carmarthen Bay (anthracite)	383
	146,875

of our rivals is increasing at a relatively even more rapid rate. Unquestionably that is partly due to the effect of protective tariffs designed to secure a home market for manufactured articles, but it is well to remember that it is not solely due to this circumstance. It is partly due to one or more of the several causes mentioned in pars. **720** and **721,** as tending to favour decentralisation of industry, or the growth of new centres of production. Among these causes in the United States it is obvious from the course of the curve showing prices in diagram III. that one of great importance is the fact that since 1889 that country has had the cheapest coal at the mines. The mines are still comparatively shallow. In many cases they can be worked for long distances by level adits (as is the case with a few of our South Wales mines). It is not for the most part necessary to work any but the thicker seams, such as facilitate the use of machinery.[1] But in comparing the price curves in the United Kingdom, the United States, and Germany it should be remembered that while the lowering of the price at the mines in the United States puts that country in a better position as compared with the two others than it occupied formerly, the actual difference in price is not an indication of a general advantage under this head of the United States. In accordance with what has already been said, the coal at the factories in the United States generally has its price enhanced by the cost of much longer haulage.[2]

516. Lignite, as the name indicates, is a woody kind of coal, sometimes of a brown colour, and hence known as brown coal in Germany. It is largely produced in Germany, Czechoslovakia, Austria, and Slovenia, as well as in the United States, where, however, it is generally returned as bituminous coal. In Germany its value per ton is little more than a fourth of that of true coal, on which account it cannot be conveyed so far with economic advantage.

517. The immense superficial deposits of **peat** in Ireland, Scotland, Germany and elsewhere are still for the most part of even more restricted utility, but are beginning to acquire increased importance in some places in connection with electricity. In Germany, Professors Frank and Caro have succeeded in adapting the Mond gas-producer to the use of peat for the production of electric power with commercial success, tar and sulphate of ammonia being obtained as by-products. As the yield of the sulphate is likely to be an important factor in the profitableness of such an undertaking, the richness of the peat in

[1] In 1891, the first year for which the statistics of machine-mined coal have been given in the United States, the amount of coal cut by machinery was only a little more than 5 per cent. of the total output of bituminous coal, for which alone coal-cutting machinery is used; in 1901 it was equal to 21·9 per cent. of that coal; and in 1913, 50·5 per cent., in 1918, 55·7 per cent. In 1904 the amount of machine-cut coal in the United Kingdom was 5·7 million tons, or about 2·5 per cent. of the total; in 1913, 24·4 million tons, or 8·5 per cent.; in 1916, 25·2 million tons, or 9·8 per cent.

[2] See *Scot. Geog. Mag.*, vol. xxxiii., pp. 490–92 (Nov. 1917).

nitrogen, which varies considerably, will affect to a large extent the availability of different deposits for this purpose.

518. IRON. The uses of iron are too numerous to specify, and for the most part too familiar to need specifying. No other metal can fully supply its place. No other metal is produced in such abundance or over so large an area of the world. At the present day, indeed, none but the most backward tribes in a few out-of-the-way islands and corners are unacquainted with its working. Its use in the past goes back to a remote antiquity—how remote it is impossible to say. The most ancient relic of an iron implement which has been brought to light is a piece discovered in 1837 by Mr. J. R. Hill walled up in one side of the Great Pyramid of Gizeh. That carries us back about 5,000 years. The explanation of the rarity of the remains of ancient iron implements as compared with those of bronze is to be found in the fact that under the influence of air and moisture iron is eaten away so rapidly that its preservation for a long period is possible only under very exceptional conditions. So liable is it to disappear that, of all the numerous articles of iron that must have existed in ancient Egypt, the remnants that have been discovered do not weigh in all more than half a pound, and this in a country with a dry climate specially suited to the preservation of such articles.

519. The discoverers of the New World stated that the inhabitants of the parts which they first touched at, the West Indies and Darien, were unacquainted with iron, and their statements have frequently been made to apply to the whole of America, including the civilised empires of Mexico and Peru. But against this idea there is the express testimony of several contemporaries of the first explorers—testimony from which it appears that the working of iron was practised before the arrival of the Spaniards in various parts of the American continent, and there is evidence of other kinds to show that it must have been so in other parts regarding which we have no direct statements on this head.

520. But ancient and widespread as the iron industry is, its rapid growth in modern times, and in particular since the close of the eighteenth century, is an astonishing fact, or would be so if we did not bear in mind the other great developments in industry and commerce within that period. In 1740 the whole production of iron in England is estimated to have been only about 18,000 tons ; even in 1796, after the introduction of spinning machinery, only 125,000 tons. The enormous growth since then is the result of the vast demand for this material which has arisen from its use in machinery, railways, ship-building and the making of bridges and other structures. Iron is, in fact, the second of the two great material factors concerned in maintaining modern industry and commerce on a large scale, coal being the other.

521. The history of iron in many of its details is of singular interest,

not only as showing how the volume of iron production has been raised to its present pitch, but also because some of the facts in that history have had an important effect on the geographical distribution of the industry.

522. Iron, it must here be explained, is rarely to be found pure. It has almost always to be extracted from ores, which vary greatly in their richness and the nature of the other substances with which the iron is combined. The ores have to be smelted or reduced to a metallic condition by heat and chemical action, and most of the iron then sinks to the bottom of the furnace and is run off into moulds. This is what is called **pig-iron** or **cast-iron,** and is never pure. It always contains a considerable proportion of a substance called carbon, of which pure charcoal is one of the forms ; sometimes it contains substances much more injurious to its quality, the most prejudicial being **sulphur** and **phosphorus.** Even the carbon is injurious to some extent, and renders cast-iron brittle and unfit for use in the making of anything which has to stand a severe strain. It is for this reason that, by driving out almost all the carbon, cast-iron is converted into wrought or malleable iron, which does not harden greatly when cooled suddenly. This is usually effected by a process called puddling, which consists in remelting the cast-iron on the hearth of a furnace, and stirring it about when molten with a rake, which causes the carbon to escape and get burnt up in the intensely heated air of the furnace. As the carbon escapes the fluid becomes pasty, and the iron is then brought away in large lumps, and afterwards hammered into rude slabs called blooms, and rolled out to form bars, sheets, &c. In this form of iron there remains an admixture of slag or 'cinder.' The process of driving out the carbon was greatly quickened by the invention in 1784 of the reverberatory furnace, in which the charge of iron is placed in a separate chamber from the fuel and thus protected from the carburising action due to the combustion. This invention was due to Henry Cort in England, who in the previous year had introduced grooved rollers in rolling-mills for the production of bars of definite shapes.

523. The material so formed is very tenacious and tolerably hard, but for some purposes not sufficiently hard. For the making of weapons, and cutlery of all sorts, a kind of iron is required which, besides being very tenacious, must also be flexible, elastic, and very hard ; and for these and other purposes iron is converted into **steel,** which is nothing else than a form of iron containing a small proportion of carbon. Before the invention of the processes described below (**532-3**) for introducing a desired proportion of carbon on a large scale, the term steel was applied only to iron containing from 0·3 to 1·5 per cent. of carbon ; but these processes have introduced new varieties of iron, which caused at first some confusion in the nomenclature. This has at last been finally settled. The term steel is now confined

to products which contain between 0·3 and 2·2 per cent. carbon, that is, enough to make them harden greatly when cooled suddenly, but not enough to prevent them from being usefully malleable at some temperature. The name of weld-steel is given to all varieties of iron made by the old puddling process above described, but containing carbon within the limits stated as well as an admixture of slag. The best steel, however, made by the process described in par. **531** is free from slag, and the new processes referred to have led to the production of a kind of iron containing less than 0·3 per cent. of carbon but quite free from slag. This is what is known as **ingot iron** and is very malleable, like wrought iron, but lacks the property of sudden hardening. Other slagless irons containing not more than 2·2 per cent. of carbon are known as half-hard steels.

524. The history of the iron industry consists in a gradual series of improvements in the methods by which all these processes are carried on. Only a few of the great steps in advance can here be mentioned ; but with reference to these it ought to be explained that the most important of these improvements, associated with the names of certain inventors, are in many cases only slight modifications of methods which in the course of the gradual development of this industry had been previously suggested ; modifications, however, which were just what was needed to make the methods practically useful (comp. **137**).

525. In ancient times, when the methods of working iron were very defective, good iron could be made only from the best ores, and hence districts containing ores of fine quality had the principal trade in iron. During the early history of Greece certain tribes inhabiting the northern slopes of the tableland of Asia Minor, to the west of Trebizond, among others the Chalybes, seemed to have carried on a large trade in iron for this reason, and from them the Greeks derived their word *Chalybs* for hard iron or steel. To the Romans were known many deposits of iron ore, including the rich ores of Bilbao, in the north of Spain.

526. Remains of Roman ironworks are found in various parts of Great Britain, but so imperfect were their methods of smelting, so small a proportion of the iron was obtained from the ore, that the slag or refuse material from the smelting furnaces of the Forest of Dean, in Gloucestershire, supplied at a later period the only ore required for the furnaces of that region for a period of between two and three hundred years. At the same time, so expensive were these old Roman methods, that, according to an experiment made by the Austrian Count Wurmbrand, if these same methods were practised at the present day a ton of iron could not be made for less than £200.

527. Down to a comparatively recent date one reason of the limited and costly production of iron was that wood or charcoal was the only fuel used in smelting ; and this fact had an important effect both on the geographical distribution of the iron industry, and the aspect of

those regions in which that industry was long pursued. Iron could be smelted only in the neighbourhood of forests, and in process of time forests were cleared in feeding the furnaces. The forest from which the Weald takes its name perished in supplying fuel to the iron-furnaces of Kent and Sussex, the last of which was blown out early in the nineteenth century. An English parliamentary report of the year 1719 makes strong complaint of the devastations wrought by the ironworks in the counties of Warwick, Stafford, Worcester, Hereford, Monmouth, Gloucester, and Salop. About twenty years later the English import of foreign iron was computed at about 20,000 tons annually—ten per cent. more than the home production (**520**). The greater abundance of wood in Germany as compared with England was one important reason why the iron industry of the former country was greater than that of the latter even as late as the earlier part of the eighteenth century.

528. Coal was first used with practical success **in the smelting of iron** by Dud Dudley (son of Lord Dudley) in 1619, but the practice was then followed only by himself, and the knowledge of it died with him. The use of coal in the form of coke was introduced by the Darbys of Coalbrookdale early in the eighteenth century, but the process was kept a secret by them, and it was not till after the middle of that century that it became generally known. Some coals, such as the splint coal of the Glasgow district, are capable of being used in the blast-furnace even without being made into coke. Though a great economy is effected by the use of coke or coal, yet even in the improved furnaces of the present day, such fuel does not make so pure an iron as charcoal, inasmuch as it usually contains sulphur and other ingredients more or less noxious. In Sweden and Russia, the two European countries richest in forests, charcoal is still used in iron smelting-works, and to this fact the high quality of Swedish and some of the Russian iron is partly due.

529. Besides coke or other fuel, it is necessary in the case of most kinds of iron ore to put into the smelting- or blast-furnace along with the ore a certain quantity of a material intended to facilitate the reduction. The material so employed, called a flux, is generally limestone or lime ; and consequently facilities for obtaining this mineral form an important geographical factor affecting the prosperity of the iron industry in different places. For some kinds of ore, as for that called red hematite, which contains 55–70 per cent. of iron, this is not always required. Most kinds of ore, too, require to be roasted previously to being put in the blast-furnace—an operation performed in kilns or by laying out the ore in a heap mixed with coal in the open air and setting fire to the heap at the end from which the prevailing wind blows. In the case of blackband iron ore (**687**), there is generally enough matter of the nature of coal in the ore to render the addition of coal unnecessary in roasting. The effect of the roasting is to reduce the bulk of the ore which has to be put into the blast-furnace, and at the

same time to remove by burning most of the sulphur and other substances that can be volatilised. For red hematite this operation is considered unnecessary.

530. After the introduction of coal and coke in smelting, the next great step in the economising of fuel was due to the invention of the **hot-blast**, that is, the practice of raising the air used in blowing the smelting-furnaces to a high temperature before introducing it into the furnace. This invention, due to Mr. Neilson of Glasgow, and first applied in 1828, afterwards, in 1832, first in Germany, still more economically by using the waste gases of the furnace to heat the blast, enables the same quantity of fuel to smelt more iron than could be done with a cold-blast; and the saving by this means has been increased by raising still higher the temperature of the blast. About 1870, in the best-constructed furnaces the blast had a temperature of only about 800° F., but afterwards it was sometimes raised to as high as 1,650° F. Such high temperatures were, however, found to be rapidly destructive to 'pipe-stoves' of the old type, and these are consequently now superseded by a new type of furnace in which the blast is usually maintained between 900° and 1,200°, occasionally at as much as 1,400° F. Blast-furnaces have also been enlarged and improved in construction. In 1880 an outturn of 115 tons of iron per day was exceptionally large, in 1898 a furnace at Pittsburgh, U.S.A., made as much as 711 tons in a day. The waste gas which used to be seen burning at the top of the furnaces is now utilised to heat the boilers of the engine employed to work the blast and the hot-air stoves—an idea which originated in France in 1814, though it has been applied in a sufficiently simple matter only since about 1850 (first in South Wales). By all these means the consumption of coal has been so greatly reduced that, whereas in 1796 six tons of coal were required to produce one ton of iron, two tons of coal (one of coke) now suffice for that production. A further great economy in the iron industry has been made where the iron is worked up in the same establishments in which it is extracted from the ore. The gas of the blast-furnaces is then employed also to drive the rolling-mills and other engines, and the heat of the molten cast-iron is not lost till the iron is delivered as rails or in some other form. Recently iron ores have also been smelted by electricity.[1]

531. Further great developments of the iron industry have been due to the inventions which have done so much to cheapen the production and extend the use of steel as compared with wrought iron. The old method of making steel by the process called **cementation** is still the best, and indeed the only method by which steel of the quality required for making good cutlery can be manufactured. This method consists

[1] Mostly only on a small scale, but in a valley of the French Alps near Grenoble there are electric blast-furnaces each capable of producing from the ore 12 tons of steel in twenty-four hours. (This note was written in 1903. Since then the use of electric furnaces in the steel industry has been rapidly extending, but more for the refining of steel than for the smelting of ore.)

in sealing up bars of iron in fireclay troughs along with a quantity of charcoal, in which the bars of wrought-iron are embedded, each separated by a layer of charcoal from the others, and exposing them thus to a high temperature for a week or ten days, according to the quality of steel required. At the end of the period the iron is found to have combined with the requisite amount of carbon, but to have become porous and rough on the surface, on which account it is known as blistered steel. This, after being condensed by hammering and rolling, and fused in crucibles to get rid of all traces of slag or cinder, forms the finest kind of cast steel. The hardest steel thus made has about 1·2 per cent. of carbon. The process, from its nature, is obviously a costly one.

532. There are now many methods of producing **cast-steel** on a large scale, and three of these are sufficiently widely practised to have a geographical interest. The first of these, introduced before 1860, is that which is associated with the name of Sir Henry Bessemer, being employed in the production of what is called Bessemer steel, although the method as now practised in most of the great iron-countries involves an important improvement introduced by Mr. Mushet. By the Bessemer process molten pig-iron is poured into a vessel known as a converter lined with a highly refractory material, usually **ganister** (**571·21**), so arranged that cold air can be blown through the molten mass, burning away both the carbon and the silicon entirely. The due proportion of carbon is afterwards added and mixed with the fused metal by a repetition of the blowing. As originally devised, this process was found to be unsatisfactory except in the case of a few ores. The resulting product was very brittle, and Mr. Mushet's improvement consisted in adding the carbon in a compound containing manganese, which serves to correct the fault to which this brittleness is due. The compounds employed are **spiegeleisen** and **ferro-manganese,** which are made from certain iron ores rich in manganese, such as are found in Spain, the Siegerland district in Germany, Greece, Sweden, and elsewhere. When the ore used in making the pig-iron put into the converter itself contains a sufficient amount of manganese, the use of spiegeleisen or ferro-manganese is not necessary. The amount of iron that may be converted into steel in a single converter at one time by this process varies from three to ten [1] tons, according to the capacity of the converter.

533. Another process, known as the Siemens-Martin or open-hearth process, differs from the Bessemer process only in that the operations are performed in a different kind of furnace, in which the air employed to remove the carbon plays over the molten metal instead of being blown through it.[2]

534. Even with the improvement of Mushet these two processes

[1] The limit about 1890 ; in 1902 there were converters of a capacity of 20 tons.

[2] Some such furnaces even in 1902 had a capacity of as much as 100 tons.

are not applicable to all kinds of pig-iron. Neither of them removes phosphorus if the pig-iron happens to contain it. Now steel is rendered brittle by even a very slight proportion of this ingredient. In the best tool steel it is considered that the proportion of phosphorus should not exceed one part in five thousand, in bridge steel one in two thousand, and in rail steel one in one thousand, and with the increasing weight and speed of trains railway engineers are becoming more exacting in this respect. The processes for making steel and ingot iron on a large scale can accordingly be applied in their original form only to iron made from ores in which phosphorus is not contained, or is present only in very small amount indeed. Such ores are known comprehensively as Bessemer ores. In the Old World, the only ore from which iron of this quality can be made in large quantity is the hematite, which occurs in the north-west of England, in northern and southern Spain, in Greece, Sweden, Algeria, and on the island of Elba. So long, therefore, as no process was known for making cast steel on a large scale so as to overcome the above-mentioned drawback, the geographical distribution of these ores was obviously greatly in favour of the English iron and steel industry, for not only did England herself possess stores of the valuable ore in the most convenient situation, but ores from Italy, Spain, and Algeria could be landed after a sea-voyage close beside the blast-furnaces of Newport and Middlesbrough, whereas on the continent a railway journey, or at least a transhipment to river or canal boats, was in most cases necessary to bring them to the districts where the iron industry is pursued.

535. It was accordingly a discovery of the highest importance for the future distribution of the iron and steel industry when a method was devised by which phosphorus could be removed from the pig-iron in the process of converting it into steel. A practicable method of doing this was invented by Mr. Thomas and Mr. Gilchrist of Middlesbrough, in association with others. The method consists in using for the lining of an ordinary Bessemer converter a composition which, while serving the other purposes of the lining, has such a chemical action as to remove any phosphorus that may be present in the iron poured into the converter. Lime is mixed with the lining to serve as what chemists call a 'base,' with which the phosphorus, quitting the iron, may combine; and the process is hence known as the basic process. If the proportion of phosphorus be too great to be removed by that means alone, additional lime is added in some form in the converter along with the metal. This process was first practically applied in 1879, and besides making the ores extracted round Middlesbrough (the Cleveland ores) for the first time available for the manufacture of mild steel or ingot iron (**523**), has enabled the mainland of Europe to compete with the United Kingdom in the iron industry more keenly than hitherto. See also **91.**

536. The basic process was first applied in the United States in

1890, but has since then made rapid progress. In the United Kingdom it is not so largely adopted as it now is both on the continent and in the United States, the reason probably being that it is not so conveniently applied to the open-hearth as to the Bessemer method of making steel, and open-hearth plates are those which are preferred by shipbuilders, to whom is due the chief demand for British steel. New processes have, however, been devised for facilitating the manufacture of basic steel by the open-hearth method, and it is probable that the method will now gain ground in this country.

537. The steel made by such processes, however, is not equal in quality even to the wrought iron which it has so largely superseded because of its lower price. For some purposes, as for the making of sheets, it is claimed that the durability of iron as compared with steel makes it the more suitable material in spite of its higher price. Wrought iron is ousting steel in making articles exposed to severe weather, as in the making of ships' decks and hatches, and it is even contended that nothing but the means of making the necessary iron on a sufficiently large scale stands in the way of the reintroduction of the all-iron ship.

538. In recent years various compounds of steel with other metals have been made for special purposes, increasingly with the use of the electric furnace. One of the most important of these is **nickel-steel,** which contains from 3 to 3·5 per cent. of nickel, and about 0·25 per cent. of carbon, and is much tougher and stronger than ordinary steel, and yet extremely ductile. The combination of properties causes nickel-steel to be regarded as the best material for the armour plates of war-vessels—at least when the outer surface is hardened by some carburizing process, followed by sudden cooling. **Manganese steel,** which contains from 12 to 14 per cent. of manganese and 1·5 per cent. of carbon, has extraordinary tenacity, but appears to be too expensive a product for ordinary use. This largely arises from its extreme and irreducible hardness, which necessitates its being cut by emery wheels instead of the ordinary tools. **Chrome steel** contains about 2 per cent. of chromium and 0·8 to 2 per cent. of carbon. When suddenly cooled it is not only extremely hard, but highly elastic, which makes it peculiarly suitable for use in the making of armour-piercing projectiles. It is also proof against the burglar's drill. **Stainless steel,** which is used for making cutlery, but also a great variety of other articles liable to be exposed to contact with water in any form, contains about 13 per cent. of chromium. What is known as **high-speed steel** is an alloy containing in its best varieties between 5 and 6 per cent. of chromium and about 18 per cent. of tungsten **(571·19)**, with less than 1 per cent. carbon. It remains hard at a temperature of even 750° F., and is hence well suited for the manufacture of turning lathes used in cutting thick slices, a process in which the great friction develops very high temperatures. Where lightness as well as great hardness and power of resisting shock is important, as in the steel used in some parts

of automobiles, a small quantity of vanadium is now frequently combined with chromium. Steel containing both nickel and chromium is regarded as essential in the making of aeroplanes.[1]

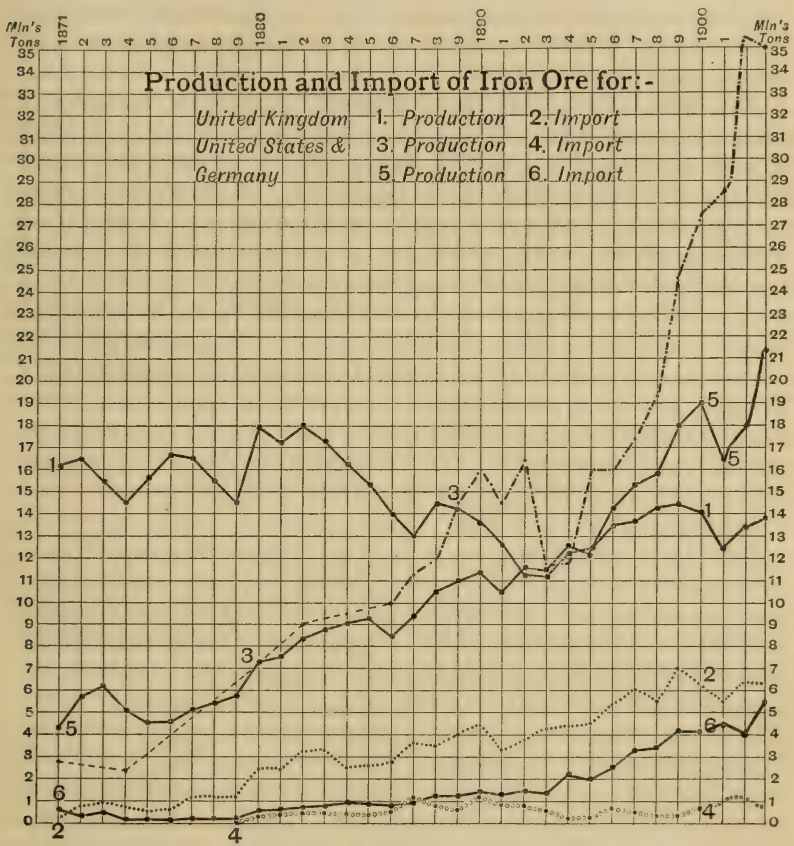
539. From the nature of the **iron industry** as now pursued it follows that it is most largely developed in those countries which stand first in commerce and manufacturing industry generally. The consumption of iron and steel is relatively high in two regions, first, one in which there are vast movements of produce, as in new and sparsely peopled countries in which iron and steel enter largely into use in connection with the transport and handling of grain, &c., and, second, one in which raw materials are subjected on a great scale to changes of form. It is in the latter, that is, in the manufacturing countries, that the demand is greatest in the aggregate, and some of the most important products of the industry required in the thinly peopled regions, such as rails, rods, sheets, structural forms, wire, &c., can be transported in a finished form or a form that involves little or no waste in their ultimate use (**205**). The fact mentioned at the close of par. **530** causes the great bulk of standard, easily transported forms like those just mentioned to be produced where the ores are smelted, that is, generally where there are dense populations with easily accessible fuel. From the table below and the diagram on p. 249 it will be observed that the United Kingdom has been losing ground, especially when compared with the United States and Germany :—

Country	Average annual production of pig-iron in millions of tons				Percentage of total of five countries			
	1871–75	1876–80	1881–85	1911–13	1871–75	1876–80	1881–85	1911–13
U. Kingdom	6·46	6·66	8·10	9·70	52·0	49·9	44·2	15·6
U. States .	2·24	2·56	4·30	28·11	18·0	19·2	23·5	45·2
Germany .	1·92	2·15	3·36	17·33	15·4	16·1	18·3	27·9
France .	1·23	1·49	1·87	4·80	9·9	11·1	10·2	7·7
Belgium .	0·58	0·49	0·70	2·23	4·7	3·7	3·8	3·6
Total .	12·43	13·35	18·33	62·17	100·0	100·0	100·0	100·0

540. The diagram shows first that the production of iron in the United States first exceeded that of the United Kingdom in 1889 and has rapidly outstript that of Germany since 1902. It also suggests one circumstance that may help to account for that. The United Kingdom is no longer able to keep pace within its own borders with the growing demands for iron ore, but is becoming more and more dependent on imports. On the other hand, our two great rivals are better furnished. The diagram shows that their production of iron

[1] On which account during the war the making of stainless steel in this country was for a time prohibited.

ore still keeps pace with that of pig iron, and five maps have been prepared,[1] showing the position of the coal and iron ore deposits of the United Kingdom, Central Europe, and portions of North America, with the view of throwing further light on the geographical situation from this point of view. These maps give a rough indication of the relative importance of the iron ore deposits as regards production. These indications are, however, based on values,[2] not quantities, seeing that



a ton of iron ore means in different cases such very different things, in consequence of differences in richness and freedom from noxious impurities. But the maps do not indicate all the advantages of situation. In Germany the iron industry has been greatly stimulated by the improvement in the Rhine navigation made towards the close of the nineteenth century (827). In the United States it will be noticed in the map including the northern parts that the area of greatest production is far from any coalfields ; but this is compensated by the mode

[1] Pp. 317, 390, 615, 639, and opposite p. 640.

[2] They are all based on values in a particular year, but nevertheless represent roughly the relative importance of different iron ore fields for a long series of years.

in which the deposits occur. They lie in enormous quantities, capable of being quarried with exceptional ease (**1301**), and of being handled and transported both by water and rail at an exceedingly low cost. On the lakes the ore is carried in large vessels, some of more than 12,000 tons, which, on reaching the lake-port for which they are bound, may have their entire cargo carried in six or seven trains of 50-ton steel railway wagons to a great iron and steel working centre like Pittsburgh; whence return cargoes of coal can always be obtained in consequence of the abundance of coal at that centre and its deficiency in the region round the lakes.

541. But, further, we have to consider the market. In this case the development of the industry was greatly assisted in the countries of both our rivals (as well as many others) by protective tariffs securing so far as possible the home market. With regard to that point all that the geographer has to note is the extent and importance of the market so secured, and it is a vital consideration that within its own borders the United States offers the largest (the wealthiest, though not the most populous) free-trade market in the world for the products of this as of most other industries, and that pre-war Germany (the German Customs Union) was one of the largest on the mainland of Europe. But apart from that it is important to remember that the great markets for iron and steel products are the most advanced industrial countries generally—for the most part so situated that they can be reached from inland centres of production in Europe and North America without break of bulk.

542. These industries demand the highest organising capacity and great supplies of skilled labour of all kinds, and hence are of such a nature as to be much more difficult to establish in small local markets than the textile industries. This is particularly true of some of the more complicated branches of the iron industry. And hence in the more advanced industrial countries we find a rapid expansion of the machine industries compensating in some measure a less rapid advance of those connected with textiles. This is illustrated by the still continued increase in the relative importance of the British exports of machinery as shown in the tables in the Appendix. Yet under this head also we can see the operation of decentralising tendencies. Though our rivals are fewer in number in this than in the textile industries, still for many years past the exports of machinery from the United States and Germany have been growing more rapidly than our own. In this industry, moreover, as skill and organisation count for very much more in the value of the finished product than the cost of the raw materials, centres by no means favourably situated with regard to these may sometimes compete successfully with others better situated in this respect, even in the remotest markets, provided only they are situated where the local market warrants their being conducted on a vast scale. Compare par. **202**.

543. Relatively to population Sweden has a large iron industry, due to the great abundance as well as to the excellent quality of its ores, and to the plentiful supply of charcoal fuel for smelting. For the last of the periods given in the table on p. 248 the countries entered therein are no longer the first five. The production of pig-iron in pre-war Russia [1] exceeded that of Belgium from 1888, and that of France from 1899, and that of Austria-Hungary also got ahead of the Belgian production in 1889. The iron industry of Spain is now also growing rapidly. As to eastern countries see **1057, 1105,** and **1128.**

544. The very rapid increase in the consumption of iron in recent years has frequently excited apprehensions as to the possible exhaustion of the supply. These apprehensions led to an inquiry being made into the subject at the instance of a committee appointed by the Eleventh International Geological Congress held at Stockholm in 1910. The results given in the summary of the returns by Professor Hjalmar Sjögren are admittedly to be regarded as only very rough estimates, but they are here reproduced for what they are worth. The reserves are classed as actual and potential, according as they refer to areas now actually worked, or areas containing ores that may become available through the extension of the means of communication and the improvement of our technical knowledge.

—	Actual reserves. Millions of tons		Potential reserves. Millions of tons	
	Ore	Iron Content	Ore	Iron Content
Europe . .	12,032	4,733	41,029	12,085 + Considerable
America . .	9,855	5,154	81,822	40,731 + Enormous
Australia. .	136	71	69	37 + Considerable
Asia . .	260	156	457	283 + Enormous
Africa . .	125	75	Many thousand	Many thousand
	22,408	10,192	>123,377	>53,136 + Enormous

As the present annual production of iron is about 60 millions of tons, it thus appears that the 'actual' reserves would not suffice for two hundred years, even if there were no further increase in the annual production. Of the known deposits of ore containing 60 per cent. of iron or more, by far the most extensive are those of northern Sweden, estimated to amount to 1,035 millions of metric tons, containing 673 million tons of iron. Next come the deposits of Krivoi Rog, estimated at 86 million tons, with 53·5 million tons of iron. The total quantity of such ores classified as 'actual reserves' is only 1,300 million tons,

[1] The average annual production of pig-iron in Russia increased from 386,000 tons in 1871–5 to 2,192,000 tons in 1896–1900, 2,794,000 in 1906–10, and 4,047,000 in 1911–13.

in addition to which there are estimated to be 687 millions of 'potential reserves.'[1]

545. PETROLEUM AND ITS PRODUCTS, with other allied substances. Petroleum, which means rock-oil, is a general name given to oils which flow freely or are pumped from holes bored in the earth. From the crude oil as it issues from the earth numerous products having a great variety of uses are made by distillation and other processes, these products differing from one another in weight and fluidity, as well as in other properties. The names given to these products are variously used in different places, which is the source of a good deal of confusion. The name of kerosene is now very generally given to a light kind of oil which is that most abundantly produced for use in lamps. Heavier kinds of oil, to which various names are given, are better adapted for heating purposes, and heavier oils still are very abundantly produced for use as lubricators for machinery. These heavy oils are what are generally known in the United States as paraffin oils, but in England this name had previously been given to an oil prepared from a different material for lighting (**555**), and hence in this country the light petroleum of the Americans is frequently sold as paraffin oil. In the Russian territory of Trans-Caucasia the name of astatki is given to a comparatively thick residue which remains after the lighter oils have been removed, and is now largely used as fuel both for land and marine steam-engines in the neighbouring parts of Asia and Europe. The same use of petroleum is rapidly becoming more general both by sea and land, and has even (1902) been resorted to on some English railways. See also **162.**

546. The products that have now been mentioned are by far the most important of those derived from petroleum, and their importance is increasing every day. The illuminating oils derived from petroleum, together with the British paraffin oil, are fast driving vegetable and animal oils out of the field in almost all parts of the world. Even in the olive refineries of Italy, where, as in the other Mediterranean countries, olive-oil was the only lighting agent known in ancient times, the refiner now finds it cheaper and better to use petroleum for light than the product of his own olive-groves. As a lubricating agent petroleum is equally victorious in competition with oils of vegetable and animal origin, the heavy oils used for that purpose being less liable than other oils to spontaneous combustion, and not so apt to become gummy and adhesive, in consequence of which they remain longer efficient. Hence, even where not used alone for the purpose, they are frequently mixed with other kinds of oil to correct such defects as those just indicated.

547. Among the more important of the **petroleum products** obtained in less quantity are gasolene, a very fluid oil used in making an inflammable gas, and now largely manufactured under the name of

[1] *The Iron Resources of the World*, vol. i., p. xxi.

petrol, or motor spirit, for use in the engines of motor carriages; benzine, employed as a solvent in the making of india-rubber and gutta-percha goods; paraffin, a white, waxy-looking solid; vaseline and other ointments, largely used in medicine; and rhigolene, the most volatile of all petroleum oils, sometimes used in medicine to cause local insensibility from the cold which it produces by the rapidity of its evaporation. Naphtha might also be mentioned among petroleum products, but of all names used in connection with the petroleum industry this is perhaps the one that has the most diverse senses. Sometimes it is employed as a general name for any oil fit for burning that escapes from the ground; in the United States it is applied to certain grades of oil made from crude petroleum, and it is also applied to an inflammable fluid obtained from wood.

548. The petroleum industry on a great scale is entirely of modern, and indeed of comparatively recent origin, and has attained its present dimensions in consequence of the abundance of the supplies that have been discovered in certain regions, the great utility of its products, the ease with which it can be extracted from the earth and transmitted long distances in pipes, and the consequent cheapness of its products. The existence of petroleum was known even to the ancients, being mentioned by Herodotus, Plutarch, and Pliny; but the great development of the industry has taken place since the two great oil-fields of **Trans-Caucasia** and the eastern **United States** began to be worked.

549. The Trans-Caucasian oil-fields belong to a larger region, extending from the Crimea in the north-west along both sides of the Caucasus, and along the northern frontier of Persia to Merv and Sarakhs in the south-east, a region in which petroleum is known to exist at many points; but there are two small districts, one near the Caspian Sea and one near the Black Sea, both on the south side of the Caucasus Mountains, in which the supply of oil in this region is peculiarly abundant. One of these is the district round Baku, on the peninsula of Apsheron, which juts eastwards into the Caspian Sea. In this district, which is by far the richer of the two, inflammable oils have been known to exist from a very remote period, and gases burning constantly as they escaped from the earth were visited for ages by Persian fire-worshippers; but it was not till long after this territory finally passed from Persia to Russia, in the beginning of the nineteenth century, that any attempt was made to utilise commercially its wealth in oil, and not till the latter part of that century that its working was taken in hand in good earnest.[1]

550. The crude oil from the wells is run by means of pipes directly into the refineries, whence the products are conveyed either in carriages

[1] In 1832 the district produced only 48 barrels of crude oil, 7 barrels, each of 35 gallons, making one ton. In 1883 the total production of the Russian Empire (nearly all in this district) was still under 250 million gallons, as against 820 millions in the United States.

made in the form of tanks, on the Trans-Caucasian railway, to the ports of Batum and Poti on the Black Sea, or to specially constructed tank-steamers which navigate the Black Sea and the Volga (**152**). Similar steamers convey the oil from the Black Sea to distant ports. In the early part of 1900 a pipe-line upwards of 140 miles in length was opened from Baku to Mikhailovo, near the eastern end of the Suram tunnel (**1019**), and this line was afterwards continued to Batum.

551. Petroleum is produced also in other parts of Trans-Caucasia, and more abundantly in the Grozny district (Terek terr.) in the east and the Maikop district (Kuban terr.) in the west of Cis-Caucasia. Grozny is connected by rail with Petrofsk, on the Caspian, and Novorossiisk, which possesses the finest natural harbour on the eastern shores of the Black Sea. From Maikop there is a pipe-line about 65 miles long to Ekaterinodar.

552. The petroleum industry of the United States is of comparatively recent origin, and has increased very rapidly since 1900. The great oil region of the United States is a strip of about 160 miles in length, and 40 miles broad in the middle, stretching from south-west to north-east in the west of Pennsylvania and New York. Oil was observed on the surface of the ground within this region as far back as 1819, but the first company for utilising the oil was formed in 1853, and at first the only method of collecting the oil was by spreading cloths over the ground to soak it up. Oil was first reached by boring in 1859, and it is since then that the oil industry of the United States has sprung up. Now there are about 20,000 wells in districts scattered all over the region, with thousands of miles of pipes, which run their products into great central refineries, and thence to the great oil-markets. What are called **Pipe Line Certificates** are issued to the proprietors of the oil-wells in proportion to the amount of crude oil which they run into the pipes for refining. Petroleum is now largely used in and near the oil region in iron-smelting and working, glass-making, and other industrial operations. (See also **897.**) Even as late as 1885 this region produced nineteen-twentieths of the petroleum of the country, but the production there has since 1900 greatly declined, the increase that has more than counterbalanced this decline having been chiefly in Oklahoma (northern part) since 1904, California (southern), the Lima oil-field (north-eastern Indiana and north-western Ohio), Kansas, Illinois, and other States.

553. A very large proportion of the refined oil produced in the United States is exported, and the markets are scattered all over the world, as is only natural in the case of a commodity having such important uses. Hitherto the markets of Europe, almost all countries belonging to which import more or less American oil, have taken the largest share of the whole American export, and it is these markets that are now largely supplied by the Caucasian oil-fields.

554. The changes in relative importance as centres of petroleum pro-

duction mentioned at the end of par. 552 are characteristic of petroleum production generally. Fields tend to be rapidly exhausted, but new fields suddenly become very productive.[1] Besides the regions already referred to, many other parts of the world produce petroleum, though few in sufficient quantity to give it great commercial value. In Europe, the principal districts producing mineral oil lie on the outer slopes of the Carpathian Mountains, in Galicia (Poland) and Roumania.[2] Germany (Hanover) and Italy have also been known for some time to possess petroleum wells, and a well has recently been discovered in France. In America, outside of the United States, the most important oil-wells are in Mexico, near the port of Tampico. Canada also has large supplies of petroleum, principally in the Province of Ontario, and these are important for the home demand, though they yield little for export.[3] The West Indies, Costa Rica, Ecuador, Venezuela, Peru, and other American countries, likewise supply petroleum in greater or less abundance. In Asia, Burma has long been known for its mineral oil, affording as it did the chief supply before the great development of the oil-fields of Trans-Caucasia and the United States. Much larger supplies are now also obtained in eastern Sumatra, especially in the part adjoining Singapore, and in eastern Java, chiefly near Surabaya. South-eastern **Borneo** and **Japan** also contribute to the quota. Numerous oil-fields have been located in the south-east of Persia, and the most important of these have latterly been developed by the Anglo-Persian Oil Company,[4] which in 1911 completed a pipe-line connecting wells situated about 50 miles north-east of Ahwaz with the head of the Persian Gulf. Mineral oils have likewise been discovered in considerable quantity at various points in the east of New South Wales, and in New Zealand, but these are mostly obtained from rocks similar to those which yield the paraffin oil of Great Britain. In Africa the principal oil wells are those of Egypt, on the west coast of the Red Sea opposite the end of the Sinai Peninsula.

555. The paraffin oil of Britain is a substance essentially similar to petroleum, and has the same uses, the lighter kinds being employed for illumination, the heavier for lubrication. Instead of gushing out of the earth, however, or being pumped out, it is extracted by distillation from solid minerals ; that is, the solid minerals are heated till the oils evaporate, and the oils are then re-condensed in separate chambers. The founder of this industry was Mr. James Young, who, while engaged

[1] The United States is still by far the most important producer, Russia till recently coming second. In 1913 the United States production was 246 million barrels, that of Russia 63 millions; but in 1919 the Russian production had sunk to the third place. In that year the United States furnished two-thirds of the estimated world-production of 577 million barrels, Mexico and Russia coming next.

[2] It is from the Dutch East Indies, however, that the largest import of motor spirit into this country takes place.

[3] Great hopes are now (1920) entertained of developing important fields in the 'tar sand' region of Alberta.

[4] In 1914 the British Government became a shareholder in this company to the amount of £2,200,000.

in working a natural petroleum which flowed from the sandstone roof of a coal-mine, at Alfreton in Derbyshire, conceived the idea that the oil might be profitably extracted from coal. This led to experiments, and in 1850 to his taking out a patent for the extraction both of oil and the solid substance paraffin from coal. These substances are now chiefly obtained from bituminous shales, and the principal seat of the industry is a district extending from Linlithgowshire through Midlothian to the west of Fife in Scotland, where these minerals are very abundant.[1] After distillation the solid paraffin crystallises in the process of cooling, and is afterwards compressed and refined. It is chiefly used in making candles, which rival wax candles in the brilliancy of their light. It is from bituminous shales, which are very abundant in New South Wales, that the oil there called kerosene is obtained—an oil used in Australia both for burning in lamps, and for mixing with coal in making coal-gas.

556. Ozokerit or earth-wax is a natural product resembling solid paraffin. It occurs in large quantities near the Caspian Sea, but the chief commercial supplies are drawn from Drohobycz and other places in Galicia (Poland). It is very difficult to refine, but yields a peculiarly fine kind of wax very suitable for making candles of a high melting-point. The light given by such candles is as 10 : 7·5 of that from sperm, and as 10 : 7 of that from wax candles.

557. Asphalt is a solid or nearly solid substance which results from the thickening of petroleum through the absorption of oxygen, and is hence met with in nature either as a superficial layer above deposits of petroleum exposed to the air, or entirely occupying the place of such deposits so exposed. Its chief use is in paving, for which purpose the asphalt of the Val de Travers in the Swiss Jura (canton of Neuchâtel) is the most valued material. It is also obtained in the canton of Vaud, and in Germany, France, Italy, and some other European countries. Algeria likewise supplies a considerable quantity of this substance to Great Britain, and a still larger quantity is obtained from the British West Indies (Barbados and Trinidad). Among other places where it is found are the neighbourhood of the Dead Sea (hence anciently sometimes known as the Asphalt Lake) and Venezuela.

558. GOLD AND SILVER. The table on p. 257, based on estimates published by the director of mints of the United States of America, shows all the parts of the world which in 1913 produced as much as 100,000 fine ounces of gold or 500,000 ounces of silver.

In 1898, the year before the outbreak of the war in South Africa, the value of the gold produced in the Transvaal was £16,044,000.[2]

559. Gold generally occurs either in alluvial deposits (into which

[1] In 1920 the discovery of large deposits of oil shale in Norfolk was reported.

[2] It is worthy of note that the production of gold in the Transvaal, by far the most important producing country, after increasing steadily year by year from 1902 onwards decreased from £37·86 millions in 1912 to £37·36 millions in 1913, and in 1919 had decreased to £35·3 millions.

it has been washed by the degradation of the rocks from which the deposits are derived) or in quartz veins in a free state. Often it is associated with various metallic sulphides, chiefly iron and copper pyrites, either in quartz-veins or in other forms in which these ores occur, but it is seldom worth extracting except from quartz-veins. Alluvial gold occurs in the form of larger or smaller pieces (nuggets) scattered amidst the detritus. From quartz-veins and other hard rocks gold has to be obtained by stamping or crushing, a process involving more expensive machinery than is used in digging for alluvial gold ; but quartz-veins are sometimes capable of being profitably worked to a depth of 2,000 feet or more.

Gold and Silver Production (in million oz., fine).
From Report of Director of the U.S. Mint.

Gold.			Silver.		
	1912	1919		1912	1919
Union of S. Africa	9·11	8·33	Mexico . .	74·64	62·68
U.S.A. . .	4·52	2·92	U.S.A. . .	63·77	56·68
Australasia . .	2·64	1·26	Canada . .	31·63	15·68
Canada . .	0·61	0·77	Peru . . .	8·35	9·78
Mexico . .	1·19	0·74	Australasia . .	14·74	7·43
Rhodesia . .	0·64	0·59	Japan . . .	4·93	4·81
Russia . .	1·07	0·58	Spain . . .	5·15	2·90
Br. India . .	0·54	0·51	C.Amer.& W.Indies	—	2·80
Br. W. Africa .	0·35	0·29	Bolivia . .	4·05	2·44
Colombia . .	0·14	0·29	Chile . . .	4·05	1·90
Japan . . .	0·22	0·21	Br. India . .	0·09	2·17

560. Silver ores generally occur in veins, or irregular deposits. But with regard to the occurrence of this metal, it is important that the silver-lead ore (**563**) sometimes occurs in great quantity in large 'pockets' or cavities in limestone rocks, which are very productive for a time, but are soon exhausted. It is from such chambers that the greater part of the silver of the United States is now obtained, and the production of the United States, having first been raised by this fact to an enormous extent, has now begun to show a less rapid rate of increase. It is since the discovery of the famous Comstock lode in Nevada in 1859 that the United States rose into importance as a silver-producing country. Already the deposits first discovered are becoming exhausted, and it is only by new discoveries that the silver-production of that country has been kept from declining. See also **569**.

561. Another matter of importance with reference to the production of silver is that a large production of the silver of the world is derived from the desilverisation of ores worked for other metals, principally lead and copper. It is by the desilverisation of copper ore (at

Mansfeld in the Harz) that a large proportion of the silver of Germany is produced.

562. LEAD. The consumption of this metal has greatly increased since the beginning of the nineteenth century in consequence of its use for the smaller gas and water pipes, and in various branches of the arts, as in lining the chambers used in making sulphuric acid (**606**). The high position formerly taken by the United Kingdom in this industry [1] has now been altered by the fact that lead ores are now generally treated in the countries in which they are produced, so that the former large import of lead ores is now replaced by that of pig and sheet lead (chiefly from Spain, Australia, and the United States). The value of ores of lead varies greatly.

563. There are various industries subsidiary to that in lead. The most important of these is the extraction of silver (**561**), a small proportion of which is nearly always contained in galena, the chief lead ore, a compound of lead and sulphur. White lead, which is very largely used in making painters' colours and in making the glaze on earthenware, is a carbonate of lead or a compound of lead and carbonic acid. Litharge is a compound of lead and oxygen, and is a yellowish substance used in making the glaze on earthenware and for other purposes. One form of this is called massicot, and from it is made by heating another compound called red lead or minium, which contains a greater proportion of oxygen, and is largely used in the making of flint glass and porcelain, as well as in making red paint.

564. COPPER. This metal is found in many if not in most countries of the world, sometimes pure (the native copper occasionally forming huge masses), more frequently in the form of ores, which vary greatly in richness. In 1867 Chile, the northern half of which is intersected in every direction by veins of copper, contributed two-thirds of the entire copper-production of the world ; but owing to the discovery of rich deposits of copper in other regions less remote from the great markets of the world, its share of the total copper-production has been greatly reduced. As late as 1880 it still stood first in the list of copper-producing countries, but now the **United States** produces more than half the copper of the world, chiefly in the states of Montana and Arizona—Mexico, Spain and Portugal, Japan, Chile, Australia (especially South Australia), being the producing countries next in importance.[2] The production of the mines of the United Kingdom is now quite unimportant.

565. The production of copper in England from home ores has greatly declined since about 1840, but there is a large import of foreign

[1] In 1913 the chief producing countries in order of importance were the United States, Spain, Germany, Australia, and Mexico.

[2] In recent years the countries showing the most rapid increase in production, besides the United States, are Japan, Canada, Peru, Australia, and South Africa. Chile, though not increasing its production so rapidly as those named, still occupies the third place (after Japan) among the producers.

ores and ores which have undergone some preliminary treatment into this country, where it is converted into pure copper, chiefly at Swansea (**750**). The greater part of the import of impure copper is in the form of regulus and precipitate of copper, both of these being copper ores partially refined, but by different methods of treatment. Copper in these forms is chiefly imported from Spain and the United States. Raw copper ore is chiefly imported from Venezuela and the Cape Colony ; and there is also a large import of metallic copper, unwrought, from Chile and the Australian colonies.

566. Being an excellent conductor of electricity, copper has had its use greatly extended of late years in making telegraph-wires for underground communication and marine cables. Apart from the electrical industry the chief uses of copper are in the making of brewers' and distillers' plant, in the making of armament, in shipbuilding, the making of plates for the printing of textiles, and in the dye industries. Copper is one of the ingredients in the two important alloys known as **bronze** and **brass**, the former composed of copper and tin (a very hard compound), and the latter of copper and zinc.

567. ZINC. This metal was first known in Europe only as an import from China and India, where it had long been employed in the manufacture of brass. It is only since about the middle of the eighteenth century that the methods of extracting the metal from the ore and treating it after extraction have been discovered in this continent.[1] The main import of this metal into the United Kingdom is in the form of crude zinc, or spelter, chiefly from Germany, Belgium, Holland, and France. A large quantity of zinc is likewise produced in the United States, chiefly in a district in the south-east of Kansas and the south-west of Missouri, in the Ozark region (Jasper co.), and from that country also there is now a considerable import of crude zinc.

568. TIN. The tin-mines and other deposits of Cornwall and the adjacent parts of Devonshire, which perhaps supplied the Phœnicians with tin three thousand years ago, continued to be almost the sole source of supply of this metal till within the last two hundred years or so. The region just referred to is still the only important place of production in Europe, but important deposits of the ores of this metal are now known to exist in many other parts of the world, and the United Kingdom now imports much more tin than it produces. The principal sources of this import are the Straits Settlements (**1081**). The islands of Banka and Billiton, belonging to the Dutch East Indies, also yield large quantities of tin, but this is sent mainly to Holland, whence considerable quantities are re-exported to the United Kingdom. New South Wales, Victoria, and all the other Australian states, including Tasmania, produce more or less tin. In South America,

[1] Prussia, Italy (Sardinia), Spain and (since the partition of Silesia under the award of the League of Nations in 1921) Poland are now the chief producers of zinc ores in Europe.

Bolivia, Peru, and other countries are known to be rich in tin ores, and Bolivia is already a large producer.[1]

Tin ore is met with either in veins (or lodes) in the rock, or scattered about in alluvial deposits. The former is called mine-tin, the latter stream-tin. The stream-tin, being generally near the surface, is naturally the easiest to obtain where it is abundant; and it is the abundance of such deposits in the Straits Settlements that makes that part of the world such an important source of supply at the present day. Tin is mostly imported in the metallic state or as a concentrate for further refinement (**205**). One of the chief uses of tin is to cover sheets of iron with a coating which serves as a protection against rust, and thus to form tin-plate.

569. QUICKSILVER, or mercury, the only fluid metal, has long been principally obtained in Europe from the Spanish mines of Almaden in the Sierra Morena, which were worked even under the Romans. In 1887 Spain furnished more than four-fifths [2] of the total quantity of this metal imported into Great Britain. The other European countries which produce much of this metal are Italy, chiefly from the long-celebrated mines of Idria in the former Austro-Hungarian crownland of Carniola, but also from mines in Tuscany. Since 1850, when the celebrated mines of New Almaden in California (Santa Clara co.) were opened, large quantities of mercury have also been produced in the United States, the mines of which country have in many years furnished more than those of Spain and Austria together. The New Almaden production, however, is now exceeded by that of Idria or New Idria in San Benito co., the county just south of Santa Clara co. The export from the United States is not proportionately large, and since 1877 there has been a great decline in its total value. Quicksilver is also produced in Algeria, Russia, China, Japan, and Peru.

The uses of mercury are various. In its pure state it is chiefly employed in the making of scientific instruments. Combined with other metals, it forms what are called amalgams, which are soft and easily fusible. An amalgam of mercury and tin was once largely used in the silvering of mirrors, but is now generally replaced by electro-deposits of silver. In mining for silver and gold these metals are frequently extracted by employing mercury to form amalgams with them, and the large amount of mercury required for this purpose in the extensive silver-mines of California and Nevada, near the chief seat of the United States' production of quicksilver, is one great cause of the smallness of the export from the United States of the latter metal.

570. SALT. This product, so universally used and so widely distributed, is more an article of local production in almost all countries than an article of international commerce. It is obtained, as is well

[1] Out of an estimated total production in 1917 of 123,000 tons, the Federated Malay States supplied above 40,000 tons, Bolivia above 26,000 tons, and the Dutch East Indies (Banka and Billiton) above 17,000 tons.

[2] In 1913 a rather smaller proportion, Italy coming next.

known, both from deposits on the land (rock-salt and brine-pits) and by the evaporation of sea-water. In the production of salt the United States, the United Kingdom,[1] India, Germany, Russia, France, Spain, Galicia (Poland), Italy, Portugal, are the leading countries. The United Kingdom has by far the largest consumption of salt per head, which is in a great measure due to the use of this mineral in the arts (**603-4**). The chief salt-exporting countries are the United Kingdom, Spain, Portugal, and Germany. Portugal is noted for the excellence of its bay-salt. In tropical countries with an excess of rain there is apt to be a deficiency of salt, and hence India imports (most largely from the United Kingdom) upwards of 400,000 tons annually.

571. MINOR MINERALS. Among these the following have some commercial importance: (1) **Antimony,** employed to give hardness to softer metals in various alloys, more particularly in the making of type-metal, bell-metal, and Britannia metal, and also used by itself in the making of concave mirrors for astronomical purposes; produced in Great Britain from ores obtained principally from Australia and China. (2) **Manganese,** an indispensable constituent of certain compounds of great importance in the making of steel (**532**). One of its ores, known as the black oxide of manganese or pyrolusite, is also largely used in the manufacture of bleaching-powder (**607**), and in glass-making as a decoloriser. This ore is obtained from various parts of the world, but at present is most abundantly imported into Great Britain from India, Trans-Caucasia, and Brazil. A manganese ore suitable for the making of ferro-manganese (**532**) is worked in Merioneth and elsewhere in Great Britain. In the United States ores of this metal are worked chiefly in Virginia, Georgia, and Arkansas. Recently the metal manganese has come to be used in various alloys. With copper it produces a very tenacious kind of bronze; with copper and zinc, sometimes with the addition of a little iron and nickel, a substance resembling nickel. (See also **538**.) (3) **Chromium,** a metal occurring in nature chiefly in the form of chromate of iron or chrome iron ore, which is used not only in steel-making (**538**), but also in the manufacture of bichromate of potash from which various pigments are derived. The ore is produced in the island of Unst in Shetland, and occurs elsewhere in Scotland. It is imported into Great Britain from Bosnia, and the south-west of Asia Minor. In the United States it is produced in California, but that country also is mainly dependent on foreign supplies. Chromium-cobalt alloys, sometimes with the addition of tungsten or molybdenum, are used under the name of stellite in the making of high-speed cutting tools containing no iron. (4) **Arsenic** is another metal chiefly used, not by itself but in one of its compounds, with oxygen—the so-called **arsenious acid,** which is largely manufactured in Germany, England, and elsewhere for the sake of the green colouring-matter it affords for wall-papers and for other purposes. (5) **Bismuth,** chiefly used to give increased fusibility to various metallic alloys, and in the manufacture of certain colouring-matters, is produced on both sides of the Erzgebirge (that is, in **Saxony and Bohemia**). The annual production of the world is estimated at less than 100 tons. (6) **Platinum,** a rare metal, intermediate in price between gold and silver, but indispensable in the chemical arts on account of its resistance to heat and acids, which renders it the best material for making crucibles and vessels required for certain purposes. It is obtained chiefly in the **Ural region** in Russia. (7) **Nickel,** sometimes used, among other purposes, for coining; formerly produced mainly in Germany, but now more abundantly in **New Caledonia,** and still more so in **Ontario,** where it is mined chiefly for American use. The metal is now finding greatly increased use in steel-making

[1] Formerly the United Kingdom ranked first in the production of this mineral, producing more than 2,000,000 tons annually, but there has been a decline since 1894 and larger quantities are now produced in the United States and Germany.

(538), as well as in plating. **Monel** is an alloy of nickel (nearly 70 per cent.), copper, iron, and manganese, strong and easily machined and little liable to corrosion: so called after its inventor. (8) **Cobalt,** in one of its forms found associated with nickel, and hence now also largely imported from **New Caledonia.** It is also now used like nickel to form a coating on other metals, but its principal use in the arts is in the form of the **oxide** (compound with oxygen), which is used as a blue colouring-matter for pottery and glass, and in that of **smalt,** which is finely ground glass coloured with this oxide, and is used in colouring paper, &c. See also (3) above. (9) **Aluminium** is a metal valuable for its lightness, bright colour, its resistance to the action of the air even in the presence of moisture, and the excellence of its alloys. It is now sometimes used for the transmission of electrical currents, for which it has the advantage of giving nearly twice the carrying power of copper for a given weight of metal. Till lately the metal was made only by expensive processes from two compounds found in nature, one called bauxite, which is obtained from the south-east of France, Styria, Ireland (co. Antrim), the United States (Alabama, Georgia, and Arkansas), and elsewhere, and one called cryolite, obtained from the west coast of Greenland. Now an electric furnace is universally used as the means of extracting this metal, and both bauxite and cryolite are used in the process, the bauxite, however, furnishing all the raw material, while the cryolite (sometimes made artificially) merely serves in a molten state to dissolve the bauxite (hydrated alumina), which is then easily decomposed by the electric current. The cryolite is used over and over again. Very high temperatures being required, aluminium factories are usually erected where much water-power is available, as at Niagara Falls, Massena (near the Long Sault rapids of the St. Lawrence, in the state of New York), the south-east of France, above all at L'Argentière on the Durance in the Briançonnais, Rheinfelden in Switzerland, and at Kinlochleven on the borders of Argyllshire and Inverness-shire, and elsewhere. Before the war France was by far the most important producer on the mainland of Europe, and the production of Germany was insignificant, but during the war Germany succeeded in establishing important works at Grevenbroich, and others are in progress. In our own country its manufacture is recognised as a key industry on account of the metal being essential in the construction of air-craft. (10) **Sulphur,** used in making sulphuric acid (**606**), in vulcanising (**446, 451**), and also as a remedy for certain vine-diseases; exported as such chiefly from Sicily, and as a constituent of iron pyrites, chiefly from Spain and Portugal. Since 1903 sulphur has been produced in large quantity in Louisiana, U.S.A., from subterranean deposits where the sulphur is fused by forcing down hot water and when fused forced up to the surface by compressed air. (11) **Mineral Manures** (**90**). Among these the most important are:—(*a*) **Potash** (**605**). (*b*) **Nitrate of soda,** used both as a manure (**90**) and in the arts (**603**), enters into world commerce as a product of northern Chile,[1] but see also **606, 608,** and **1142.** (*c*) **Phosphate of lime,** produced most abundantly in S. Carolina, Florida (at different places near the west coast) and central Tennessee, U.S.; in Algeria and Tunis, in Egypt (**1142**), and in the province of Liège, Belgium; in the form of **apatite** in Canada and Norway, and in an impure form in England (Cambridgeshire and one or two other counties); and in that of **phosphorite,** in Spain (Estremadura). (*d*) **Guano,** properly speaking an animal product, since it consists of the droppings of birds accumulated through ages in regions where there is little or no rain to wash away the deposits so formed. It is, however, worked as a mineral, and may be described as an earthy nitrate or combined nitrate and phosphate rock. Guanos of one kind or another are derived from islands on the west coast of Peru (the Lobos islands, between 6° and 7° S., yielding a lightly phosphatic product), from the Seychelles and Falkland Islands, from various oceanic islands, including Nauru, situated in about ½° S. to the N.E. of

[1] Which in 1913 was estimated to furnish about three-fifths of the world's supplies of combined nitrogen.

the Solomon Islands; Ocean Island, between that and the Gilbert group; Makatea, a French island to the N.E. of Tahiti in about 15° S., 148° W., and both the Christmas Islands, the British island in the Indian Ocean, and the American in the Pacific in 1° 40′ N., 157½° W. (*e*) **Basic slag (91).** (12) **Borax**, a compound of boracic acid and soda, found in many parts of the world with a very dry climate, such as Tibet, parts of China and Persia, the western strip of Peru, the states of California and Nevada in the United States, and also manufactured from boracic acid obtained by concentration from springs in the south of Tuscany. It has very varied uses in the arts. Among the most important are its employment in the making of enamel and glazes for pottery, and in the making of certain kinds of glass, the borax serving to some extent as a substitute for silica (**596**). (13) **Nitrate of potash.** See **605.** (14) **Graphite** or **plumbago**, popularly known as 'black lead,' a substance familiar from its domestic uses and its use in the making of lead pencils, but also very largely employed in making crucibles and type-metal, and for other purposes. Formerly the best kind was obtained from Borrowdale in Cumberland, but Ceylon, Madagascar, and Japan are now the chief sources of supply (**1070**: see also **1010**). In Germany it is produced at Passau in Bavaria, in the United States at Ticonderoga in the state of New York. (15) **Lithographic stone** is known to occur in various places, but the best stones are all obtained from the quarries of Solenhofen in the neighbourhood of Donauwörth in Bavaria. (16) **Grinding and polishing substances.** (*a*) **Buhrstones**, the stones used in the old kind of corn-mills, now to a large extent superseded by those in which steel rollers are employed in the manufacture of flour. The best specimens of this kind of stone are obtained in the Paris basin. (*b*) **Grindstones,** produced at Newcastle, at Wickersley (eight miles east of Sheffield), and elsewhere in England, at various places on the Bay of Fundy in the Canadian Dominion, and in Ohio and Michigan in the United States. (*c*) **Infusorial earth,** or tripoli powder, a fine siliceous earth used in polishing metals, glass, &c., and now also in the manufacture of dynamite, found not only in Tripoli, from which it takes one of its names, but more abundantly in Germany, on the Lüneberg Heath, between the Elbe and the Aller, and also in Scotland, France, Maryland (U.S.), and elsewhere. (17) **Gypsum,** produced in England chiefly in the counties of Nottingham and Derby. (18) **Clay.** The varieties of clay which have chief commercial value are china-clay and fire-clay. (*a*) **China-clay** is largely worked in the British Isles, in the east of Cornwall and the south-west of Devon. Besides being used in the making of porcelain (**590**) it is employed in the making of paper (**580**) and cotton size. (*b*) **Fire-clay,** used in making fire-resisting bricks, crucibles, &c., occurs in many places. In Great Britain the deposits chiefly worked are those found on or near coalfields (south Staffordshire, Glamorgan, Durham). (19) **Tungsten** or **Wolfram,** which has recently acquired greater importance from its being used in the production of high-speed steel (**538**), is mined in Cornwall, but more largely in Burma, the United States, Australia, and other countries. (20) **Asbestos,** which now has a great variety of uses—in gas-stoves, for the making of fire-proof curtains, as a packing for cylinders, and as a heat insulating covering for steam boilers and pipes, &c.—is derived mainly from Canada, Italy, and Russia, the Canadian supply coming from that part of upper Quebec which lies to the south of the St. Lawrence. (21) **Ganister,** a finely ground sandstone derived from the Lower Coal Measures, is obtained for British use chiefly from the neighbourhood of Sheffield. (22) **Fluorspar,** mined in Derbyshire, is now largely used in lead smelting and in the making of ferro-silicon and ferro-manganese. (23) **Slate** has recently acquired further importance from the fact that the waste, when finely powdered, is used in the making of bricks of great density and strength, also of pottery, green and amber coloured glass bottles, and above all cement. (24) **Monazite,** a mineral used in the manufacture of incandescent gas mantles, is found in grains scattered among other rocks, but is commercially available only where the rock is in the form of sand, as in the state of Bahia (Brazil) and in N. and S. Carolina, U.S.A. There are also promising deposits in southern Ceylon.

COMMODITIES (*continued*)

IV. Manufactured Articles in which various Materials are used

572. LEATHER. Leather consists of the skins of animals prepared in various ways. Its manufacture has given rise to an extensive commerce in articles of different kinds: first, in the hides and skins which form the raw material; second, in the substances used in treating this raw material; and third, in the manufactured product—leather, and articles made from leather. **Hides** are derived from a great variety of animals. The great majority of the larger mammals whose skins are not of more value for furs contribute to it more or less. Even **aquatic species** add their share to the leather-makers' materials. From the skin of the **white whale, or beluga,** of the Arctic Seas is made a kind of leather which is sold under the misleading name of porpoise-skin, and, being of great strength and very impervious to water, forms the best material for shooting-boots and some other purposes. The skin of the **manatee and dugong,** the two mammals which feed on aquatic plants in tropical and sub-tropical seas and rivers, is likewise used by the leather-maker. Even the skin of some animals outside the class of the mammals—for example, the **crocodile**—is likewise employed. But the animals which furnish by far the largest proportion of the hides of commerce are the domesticated species—the **horse, ox, sheep, goat,** and **pig**—which are kept in such large numbers wherever men are found above the lowest stage of barbarism. Formerly British India furnished the United Kingdom with its chief supply of hides as well as large quantities of goat-skins, but now this trade is mainly replaced by imports of leather from that country, and though India is still an important source of raw hides the Argentine Republic and Italy supply as much or more. Goat-skins are largely obtained also from South Africa and other (chiefly Mediterranean) countries, while sheep-skins are naturally obtained in greatest numbers from the same countries as those from which we draw our wool—Australia, New Zealand, British South Africa, and the Argentine Republic. Hides are preserved for and during transport either by being steeped in brine, and are hence called wet, or by some process of drying. The raw hides from the East Indies and South Africa are mostly dry, those from America and Australasia wet.

573. Tanning is the principal process resorted to in converting hides into leather. It consists in saturating the hides, after some

preliminary cleaning and dressing, with a solution which alters the chemical character of one of the constituents of the hide, and renders the hide firm and durable. Nearly always this solution is derived from some vegetable substance, the bark or some other portion of a tree or other plant, which yields the necessary principle called tannin, or tannic acid, a very powerful astringent. Substances containing this principle have been discovered to exist in the native vegetation of almost all parts of the world, and the discovery of the art of making leather by means of them was very early made, and appears to have been made independently in many different regions. The processes of tanning are represented on the oldest Egyptian monuments, and the North American Indians knew how to make a pliant and excellent leather before the discovery of America by Europeans. Nevertheless the art is said to be still unknown throughout a large part of central Africa south of the Sudan.

574. Till nearly the middle of last century oak-bark was the agent almost exclusively employed in tanning in Great Britain ; now it is only one out of fifty or more competitors, and there is a large import of various tanning-substances from many parts of the globe. Of these, however, there are only five or six imported in sufficient quantity to be separately enumerated in the British tables of trade. The headings under which they are entered are bark, cutch and gambier, myrobalans, sumach, and valonia. Under the heading bark are included not only different kinds of oak-bark, larch-bark, and others, which, besides being produced at home, are largely imported from the mainland of Europe, but also others imported from elsewhere. The bark imported from the United States is chiefly that of the hemlock spruce, the principal tanning agent both there and in Canada. In both countries, however, bark from native oaks (**477**) is used for the best leather. But now by far the most important source of tanning-bark brought to this country is Natal, where it is derived from various species of Acacia, the best being that of the *Acacia pycnantha*, Benth., or black wattle (introduced from Australia)—a bark that yields nearly a third of its weight of tannin, and the *A. mollissima*, Willd. To save carriage (**205**) there is a growing tendency to prepare tanning extracts from the bark before exportation.

575. Cutch and gambier, though associated in the trade returns of the United Kingdom, are quite different products, but they are both extracts made by boiling and evaporating, and both obtained from the East Indies, though not from the same region. Cutch, or catechu, is extracted from the chopped wood of a kind of acacia (*Acacia catechu*, Willd.) abundant in the forests of India and Burma, and is more used in dyeing than in tanning. Under the name of Borneo cutch mangrove extracts from various parts of the tropics, including the Sundarban, now enter into commerce. Gambier is extracted from the leaves of a shrub (*Uncaria Gambier*, Roxb.) belonging botanically to the Cin-

chona family (**435**), a native of the Malay Peninsula and the Eastern Archipelago, and is imported from Singapore. It is also used in dyeing, and in China is much used for chewing, along with betel-nut. Having the tannin concentrated by the process of extraction, one ton of gambier will go as far as six tons of oak-bark in tanning. Attempts are now being made to introduce the shrub into the West Indies.

576. Myrobalans are the principal of the numerous substances used in India for tanning. They are the fruits chiefly of two species of trees of the genus Terminalia abundant in Indian forests. **Sumach** consists of the powdered leaves and young twigs chiefly of one species of shrub (*Rhus coriaria*, L.), and is imported from the Mediterranean, and above all from Sicily, where the best quality is cultivated. **Valonia** is the name given to the acorn-cups of a species of oak which grows in the Levant. It is imported mainly from Smyrna, and is used in dyeing as well as tanning. Of other vegetable substances used for tanning the best-known perhaps is **divi-divi,** which consists of the twisted pods of a leguminous tree known as *Cæsalpinia coriaria,* Willd., a native of South America. In recent years there has been a rapidly growing export from the Argentine Republic of extract of the wood of the quebracho (*Aspidosperma Quebracho,* Schlecht.), and of the wood itself for the rapid tanning of cheap leather.

577. Attempts to tan with mineral substances have been made for about a hundred years, and these attempts have at last been crowned with a certain measure of success, the best results having been obtained by means of compounds of the metal chromium. Chrome-dressed kids are now a regular manufacture.

578. For certain purposes skins are made into leather without tanning. A soft flexible kind of leather suitable for gloves, &c., is made by a process called **tawing,** in which alum and other salts are the principal substances employed. **Wash-leather,** or chamois leather, is made by working oil into the cleaned skins. **Morocco leather** when genuine is made from goatskin, is always coloured on one side, and on that side has the well-known roughened surface imparted to it by means of a stamp, generally of boxwood. It takes its name from the country where it was first made,[1] and where it is still largely manufactured—a country which, like all other mountainous countries bordering on the Mediterranean, has a great abundance of goats. By the Moors it was introduced into Spain, where Cordova and other Moorish cities acquired celebrity in connection with this product, so that the name of **cordova leather or cordwain** came to be applied as a general term for Spanish goatskin leather. About the middle of the eighteenth century the manufacture was introduced into Alsace, and since then it has been carried to all other industrial countries, and it has consequently declined in Spain, which for centuries supplied fancy leathers to all

[1] Or through which it was first introduced into Europe. According to some accounts what was first known as Morocco leather was really leather manufactured in Kano, in Sokoto.

Europe. **Russia leather** is distinguished by its peculiar odour, which has this advantage, that it is so disagreeable to insects that the presence of a few books bound in this leather in a book case is said to be enough to preserve the other volumes from their attacks. The odour is due either to the leather being tanned with the bark of the Russian birch, or to its being treated with a kind of oil made from the bark or the bark and roots of that tree. This kind of leather is still a speciality of the Russian leather industry.

579. The European countries in which the manufacture of articles from leather is most highly developed are Germany, France, and the United Kingdom. In quantity of production and amount of export **Germany** stands first, which is a natural enough consequence of its central position in a populous continent, and the advanced state of its industrial organisation generally. The raw materials of the manufacture, like those of the paper industry, have to be collected from all quarters from among a dense population, and thus can be most abundantly and cheaply supplied to factories that are centrally situated. (See **585.**) Coloured leathers are the speciality for which Germany is chiefly noted in this branch of industry. **France** comes next to Germany in the extent of its leather manufacture, and it stands pre-eminent in the amount of its glove manufacture, even if not without a rival as regards quality in this department. It is also noted for its lacquered or patent leather, a product which was first made in that country about the middle of the eighteenth century. Both of these countries have an export of leather manufactures of more than twice the value of that of the United Kingdom, and an export against which there is to be set only a trifling import. In the case of the United Kingdom, on the other hand, the value of the import of leather-manufactures equals or exceeds that of the exports, the most valuable item among the imports of this kind being gloves, chiefly from France, Belgium, and Holland, the latter no doubt largely of German origin. Of the British exports of leather-manufactures, the most important, next after boots and shoes, are saddlery and harness (made chiefly from pigskin), these being goods for which British leather-manufacturers have a high reputation. The United States, as is natural in the case of a country which has such a vast area devoted to the rearing of domestic animals to draw upon for the raw material,[1] has a very large industry in leather (**1294**) and vast native supplies of tanning bark (**573**).

580. PAPER. Paper is made chiefly from vegetable fibre reduced in water to a pulp so fine that the particles of fibre can scarcely be felt. Nowadays a certain proportion of China clay (**590**) is often added to the pulp, and, when not in excess, it improves the inferior qualities of paper. The pulp, after being bleached by means of chloride of lime (**607**), is ready for paper-making, and for this purpose is kept by constant stirring

[1] Till late in the nineteenth century the imports of leather manufactures into the United States greatly exceeded the exports thence, but in 1900 the value of the exports was nearly twice that of the imports.

as nearly as possible of an equal consistency throughout. When the paper is made by hand, as some of the best kinds still are, a frame called a mould, consisting of a piece of fine wire gauze bordered by a raised rim, is introduced into the pulp by a workman, who with the aid of another light frame withdraws as much of the pulp as is necessary to make a sheet of paper. The water quickly drains through the wire gauze, leaving the vegetable fibres to form a thin moist film. This film when dried by various processes forms paper ; not, however, paper that can be written on, but that soft porous kind which is used as blotting- or filtering-paper. To be made capable of receiving ink without allowing it to run it must be immersed in size (the essential ingredients in which are rosin and alum), and various other operations are necessary before writing- or printing-papers have the appearance and finish that belong to them when sold.

581. Machinery for paper-making was first used with success early in the eighteenth century. All such machines consist in contrivances for feeding a supply of paper-pulp equally to a revolving endless band or apron of fine wire gauze, and passing it thence to a similar apron of felt or flannel, and afterwards to pressing-rollers, &c. So perfect is the machinery used nowadays, that from pulp constantly supplied to the machine a continuous roll of paper of any length (sometimes miles long) can be delivered from it in a finished state, either entire or cut up into sheets. The printing of newspapers is now done to a very large extent on the uncut roll.[1]

582. In the manufacturing countries of Europe and America the vegetable fibre for paper-making is very largely used in the form of rags, that being the form in which the most useful fibres for the purpose, linen and cotton, can be obtained cheapest. The best kinds of paper, at least in western countries, are still made from linen rags ; but the supply of these is totally inadequate to meet the requirements of paper-makers, and hence not only cotton but also woollen rags are likewise employed, and vegetable fibres are now largely used in other forms. In particular, a kind of grass called esparto[2] or alfa, which covers immense areas in the arid regions of southern Spain and northern Africa, from Tripoli westwards, is now imported into Great Britain for paper-making in much greater quantity than rags ; but whereas linen or cotton rags yield about half their weight in paper, esparto yields only about one-sixth of its weight in that form. Lalang grass, a Malayan rubber weed, is said to compare favourably with alfa, though not with Spanish esparto as a paper-making material. Of late years, esparto has been largely displaced as a paper-making material by wood-pulp,[2]

[1] A large paper-making establishment on the Thames claims to have taken pulp from a steamer, made it into paper, dispatched the paper to London, and had it returned to the mills as a book within four hours. *Times Trade Supp.*, No. 159.

[2] First used in 1856. About 1885 rags made up only 20 per cent. in value of the British import of paper-making material; in 1913 only about 6 per cent., wood-pulp 79 per cent., esparto and other materials 15 per cent.

either in the form of mechanical wood-pulp, made by simply grinding down the wood-fibre chiefly of spruces, pines, and poplars, or in that of chemical wood-pulp made from the same woods by one or other of two different processes, in one of which soda is the chief agent, and in the other sulphurous acid along with either lime or magnesia. The mechanical pulp is a very inferior sort, used only in making cheap papers. The making of wood-pulp is carried on only where there is abundance of the raw material along with water-power (**114**). Into the United Kingdom wood-pulp is imported chiefly from Norway and Sweden, and next to these from Canada.[1] The refuse of jute-manufactures likewise affords an important material for this industry, which can also utilise directly a whole host of vegetable fibres, some of which—for example, the bast fibres of the baobab—are of great value for special purposes, such as the making of paper for bank-notes. In China and Japan, where the paper-makers excel the best European workmen in the making of some very delicate but strong papers, the material chiefly used is the inner bark of a tree known as the paper mulberry (*Broussonetia papyrifera*, Vent.), the leaves of which can be used in feeding silkworms. The strength of this paper is due to the fact that in making the pulp the long bast-cells are not broken and torn as in European pulping-machines, but merely softened and separated by beating. In taking up the pulp in the mould the cells are made to lie in one direction, and the paper may be strengthened by taking one or more additional dips, in which the cells are made to lie in other directions. Gums are used to make the cells of the pulp adhere. Thick papers are made capable of being used for many of the purposes of leather. The Japanese also make a very strong kind of paper from seaweed.

583. When we consider the immense consumption of paper in forms with which every one is familiar, and the great variety of the purposes to which paper is now applied, we can realise to some extent the importance of this invention in the history of mankind. It has often been pointed out that, without some cheap material to make books of, the invention of printing would have been almost fruitless. The history of the art of paper-making is therefore of peculiar interest.[2]

584. The art does not seem to have been discovered independently in the West. From China it spread into central Asia, and a paper-factory was established at Samarkand early in the eighth

[1] In 1901, the first year in which chemical and mechanical wood-pulps were distinguished in our returns, the value of the chemical wood-pulp imported was about twice that of the mechanical.

[2] Parchment (**496**) and papyrus rolls were the ancient substitutes for paper. The latter were made by causing the thin inner skins found at the bottom of the stems of a kind of rush which grows in the Egyptian delta to adhere together at their edges. The process is obviously a laborious one, so that the roll could not but be costly, yet Egypt carried on a large and lucrative trade in this article, and vast thickets of papyrus grew where there are now fields of cotton, maize, rice, &c.

century A.D., when that town was in the hands of the Arabs. By the Arabs it was introduced into Spain, and it is certain that linen rags had come to be used for the purpose before the close of the twelfth century. It was probably for this reason that a small district situated to the south of Valencia in Spain, which had been celebrated in Roman times for its flax, was equally celebrated in the twelfth century for the excellence of its paper, which was exported thence both to the East and West. The art, if not first practised, was at least first firmly established in England in 1588, when a paper-mill was erected at Dartford in Kent, which county has always been noted for its excellence in this branch of industry. Into Scotland, where it is chiefly carried on in the counties of Mid and East Lothian, it was not introduced till near the close of the seventeenth century. Everywhere this industry is carried on, as might be expected, by the side of clear streams, which supply the water required for making and washing the pulp, and not far from great consuming centres.

585. Among European countries, the United Kingdom and Germany are the two rivals in the consumption of paper relatively to population, both of these countries being estimated to use upwards of 13 lbs. of paper per head in a year; whereas France, which comes next in this respect, is estimated to consume less than 10 lbs. The production of paper in Germany, however, greatly excels that of the United Kingdom—excels it in a much higher ratio than the population of Germany exceeds that of the British Isles. This superiority in the amount of the production in Germany is, no doubt, due to the greater abundance of the raw material, Germany lying in the centre of a populous continent from which rags may be collected without any break in the mode of carriage. Germany supplies the largest share of imported rags for paper-making in Great Britain, and for its own paper industry makes use of little esparto, its abundant supplies of rags, and now also of wood-pulp both of native and foreign origin, enabling the paper-makers to dispense with the other material.

586. The large production of paper in Germany leads to a large export of paper and paper manufactures from that country. All other leading countries belonging to the mainland of Europe, except Russia and Spain, export, like Germany, more paper than they import; and the fact that Spain, which exports so much of the raw material for this manufacture, and a raw material so bulky in proportion to the manufactured article made from it, should be an exception in this respect, is a striking indication of the backward state of industry and the room for development in that country. The British imports of paper and paper manufactures greatly exceed the exports, and this disproportion tends to become greater. The excess on the side of imports is much greater in quantity than in value, the British exports being mainly of high quality—writing and printing papers, and paper-hangings, for all of which this country has long been justly noted.

587. In the consumption of paper relatively to population the United States are ahead even of Great Britain and Germany, which is no doubt chiefly due to the wide circulation of newspapers in that country, and hence speaks volumes not only for the advanced state of popular education, but also for the general diffusion of ordinary comforts among the people. To meet this large consumption there is not only an extensive native industry, supported to a large extent (as might be expected) by the importation of foreign rags, but also a large import of manufactured paper, notwithstanding the existence of a customs duty upon this commodity.

588. Paper manufactories on the European model have been erected in the principal countries of eastern Asia, and in India those set up in the neighbourhood of Calcutta and Bombay have already almost extinguished the hand-made paper, strong though coarse, once largely made by the Mohammedans of that country. Of the factories of this kind in Japan one, at Tokyo, is a government establishment, and the vellum paper exhibited at the Sydney International Exhibition of 1879 by that establishment was pronounced to be of wonderful strength and texture, and the best and most remarkable exhibit of paper manufacture that had come under the notice of the judges.

589. During the war Germany developed a large manufacture of paper yarn, and cloth, and the cloth made of this material is now said to be washable, sewable, soft, porous, and warm.

590. EARTHENWARE AND PORCELAIN. The simplest form of manufactured article made from earth, or rather from clay, is a brick dried in the sun, and we may be sure that this is one of the earliest of human inventions. Bricks of this kind are still made in Egypt and other parts of the Old World where fuel is scarce and sun-heat by day quite or nearly constant, and also in those parts of the New World which have a similar climate, being known in the latter regions, which were formerly to a large extent under Spanish rule, by the Spanish name of adobes. It was but a small step to the burning of bricks by artificial heat. The potter's wheel, by means of which mere steadiness of hand enables a workman to mould moist clay into a perfectly round form, is likewise an invention of great simplicity and great antiquity.[1] The method of glazing pottery is a less obvious discovery, and must have been due, like a host of other inventions, to some fortunate accident. The oldest specimens of earthenware that have come down to us are unglazed. Yet the art of glazing was known to the ancient Assyrians, Egyptians, and Etruscans, all of whom are noted among the nations of antiquity for their productions in pottery. Improvements in the potter's art were made by the Arabs during the period of their highest civilisation. By them the making of painted earthenware with a finely glazed or enamelled

[1] But unknown, like every other form of wheel, in the New World before the time of Columbus.

surface seems to have been practised before it was known to any European people. But the finest of all kinds of earthenware, the kind known as porcelain, was originally a Chinese invention, referred by Chinese chroniclers to the time of a dynasty which reigned in China from the second century B.C. to the first A.D. In Europe, however, this earthenware was unknown till the thirteenth century, and does not seem to have become widely known till it was introduced by the Portuguese about 1500, which accounts for the fact that the name of porcelain (together with its equivalents in other European languages) is one of Portuguese origin. It was two hundred years later still before the art of making porcelain became known in Europe, where it was discovered independently. An inferior kind of porcelain was made at St. Cloud in 1695, but the true or hard porcelain, as it is called, was first made about 1709 by a German alchemist of the name of Böttcher, who discovered it to be the product of a mixture of sand with kaolin or china clay (**571·18**), a fine kind of clay resulting from the wearing away of granite rocks under the action of the weather. Immediately after this discovery a porcelain factory was set up at Meissen in Saxony, where it is continued to the present day. Efforts were made to keep the art secret, but it gradually spread to other countries, and is now carried on in all countries which have a highly developed manufacturing industry.

591. For the manufacture of ordinary pottery many kinds of clay will suffice provided that they are free from iron, which causes the clay to fuse during the process of baking. Other ingredients are also used, such as burnt and powdered flint and phosphate of lime, the latter often in the form of bone-ash (**490**). The decorations on ordinary pottery are painted on the unglazed ware, and are afterwards protected by a glaze composed of various ingredients fused together by a second baking. The glaze on porcelain is merely a thin coating of glass, and the painting is added on the glaze by means of pigments composed of finely powdered coloured glass, after which the articles in this case also are again put into a kiln to be fired. An unglazed kind of earthenware under the name of terra cotta is moulded into statuary and other kinds of ornamental articles, and unglazed pottery is extensively used in the south of Europe, in Africa, and Asia.

592. In England the manufacture of earthenware remained in a backward condition till after the middle of the eighteenth century. Its chief seat was Burslem, in north Staffordshire, a place well suited for this branch of manufacture on account of the great variety of clays found round about it, as well as the abundance of coal in the vicinity. It is important that among the clays of this district ('the Potteries') is a great abundance of the coarse clay used in making the saggers or seggars in which the earthenware is baked. The presence of these two heavy materials, coal and coarse clay, accounts for the fact that this still continues to be the centre of the English manufacture of

earthenware and porcelain, now that this branch of industry has attained greater dimensions in England than in any other country in the western world, and clays, flints, and other raw materials have to be brought to the district from more or less distant parts. The finer kinds of kaolin for the manufacture are obtained (in the British Isles) solely in Cornwall and Devon, but are worked up into porcelain in Staffordshire, because it is cheaper to send kaolin to the Potteries, where there is abundance of coal and most of the other materials required for the purpose, than to bring the coal and other materials to the districts that furnish the kaolin.

593. The first great improvements in English pottery were due to Wedgwood, who was born at Burslem in 1730, and since his day the art has been brought in this country to such perfection that the best English varieties of earthenware are unsurpassed if not unrivalled by those of any other part of the world. Besides the products of the Potteries, in the local sense of that word, England is noted for its ornamental stoneware (the hardest and heaviest kind of earthenware) made chiefly in London (Lambeth).[1]

594. Next to the United Kingdom Germany has the largest industry of this kind as well as the largest export, and France comes third. Formerly Meissen (**844**), in Saxony, and Sèvres, near Paris, vied with one another in producing the most beautiful coloured porcelains known, but English porcelain now has a place in the first rank.

595. In the East, China is still noted for its porcelain, which it exports to a considerable amount (chiefly from Amoy); and so likewise is Japan, into which the art was introduced from China.

It may be noted in conclusion that hardly any other branch of industry has so many names relating to the geography and history of the art in general use in connection with it. In English porcelain is very commonly known by the appropriate name of china-ware, and kaolin as china clay. The name of majolica was given by the Italians to painted and enamelled earthenware which they appear first to have become acquainted with as a product of the island of Majorca, and from the Italian has been adapted into English. Faience is a name for the same kind of ware derived from the Italian town of Faenza, where it was first made in Italy. Delft is the name of another kind of painted and enamelled ware first made at the town of that name in Holland, and painted blocks of this kind of ware are generally known as Dutch tiles.

[1] About 1885 the United Kingdom exported earthenware and porcelain to the value of three or four times the value of its import, the exports being sent chiefly to the United States, the Australasian Colonies, and British North America. At the beginning of the twentieth century the value of the British export was only about twice that of the import, a change chiefly due to the growth of the imports. Canada, Australia, the Argentine Republic, and Brazil were in 1913 our chief external markets. In the United States the home industry developed rapidly under the protection of duties varying till recently from 20 per cent. to 60 per cent. *ad valorem*.

596. GLASS is a substance made by melting together various ingredients, of which silica is always the chief, and is the only one that enters into the composition of all kinds of glass. Silica is one of the most widely diffused substances in nature, and is found in various forms, quartz and flint being the most familiar of those in which it is met with in a compact state. In thin pieces of either of these minerals the somewhat glassy appearance is at once apparent. A still commoner form of silica is sand or sandstone, both of which are originally deposits of the sea, or of rivers or lakes. Most commonly they are both impure, discoloured, it may be, by iron, or mixed with lime or other ingredients; but sometimes they consist of nothing but silica, and such pure sand or sandstones afford the best material for glass-making, the sandstones being first ground into sand. In England various deposits of sand, at Lynn in Norfolk, at Alum Bay in the Isle of Wight, at Hastings, and Leighton Buzzard, have in turn been noted for the excellence of the material which they afforded for glass-making. In France the most famous deposits employed for the purpose are the sandstones of Fontainebleau, but at the present day the United States claim to possess, in the west of Massachusetts and elsewhere, the finest of all glass-sands. (See also **571·23.**)

597. Along with silica there is always fused in the making of glass some alkaline substance, either soda or potash. Glass made solely from soda is found in course of time to be perishable, and hence, in the making of most kinds of modern glass, lime is added to render the glass more lasting. Soda is chiefly used in the form of carbonate of soda and sulphate of soda, which are largely manufactured for the purpose (**603-4**); but for making some of the commoner sorts of glass, as bottle-glass, common salt is sometimes employed. Potash (**605**) is generally used in the form of carbonate of potash (the pearl-ash of commerce), sometimes in that of nitrate of potash or saltpetre (**606**). The glass made from potash is the freest from any tinge of colour, but that made from carbonate of soda, besides being nearly colourless when the other ingredients are pure, is easier to work in the state of partial fusion in which glass is usually treated. For ordinary purposes, accordingly, this substance is preferred. Potash is used either with or without lime in the manufacture of some of the best kinds of glass, such as Bohemian glass and English flint glass (crystal). In making this last kind of glass, lead (generally in the form of red lead—**563**) is used instead of lime, rendering the glass softer and more fusible and lustrous. The use of lead is an English invention of the eighteenth century. Besides these ingredients various others are used for special purposes, as to remove colours [1] which some impurities in the materials employed in making the glass might impart, or to give the colours desired to coloured glass. In the making of bottle-glass, the colour

[1] For this purpose manganese is chiefly used, but when in excess this substance itself imparts an amethyst hue to the glass.

of which is an unimportant consideration, a great variety of ingredients are employed. In Germany some kinds of rock, such as basalts, trachytes, granites, &c., which contain a certain quantity of soda and potash along with from 65 to 75 per cent. of silica, and are easily fusible, have been employed with success in glass-making.

598. In the process of manufacture glass, after the fusion of the materials, is worked at a high temperature, which maintains it in a soft and somewhat pasty condition, and it is frequently re-heated. The implement chiefly used in the manufacture is the blow-pipe, by means of which balls of the glass paste are blown out into hollow forms. To make bottles and similar articles, almost all that is necessary is to blow the glass in moulds of the proper shape. When flat sheets are required, there are two ways of making it from blown glass. By one method the hollow ball after being blown out is transferred to the end of an iron rod, and an opening being made opposite the end of this rod the piece of glass is twirled round and round continuously, and gradually made to open out into a flat sheet, with a thick lump in the middle (the bull's eye). The glass so made is what is known as crown-glass. By another method, now more largely used, a long cylinder is made by blowing and twirling the blow-pipe, and the cylinder being cut open by a straight line is made to open itself out and fall flat on a table. Only the best kind of glass, made from the most carefully selected materials, is capable of being rolled out into sheets by means of steel rollers. Glass so made is called plate-glass. Flint-glass is the kind best adapted for being cut and engraved in the cold state. Under the name of Jena glass a very fine kind of glass used for scientific purposes was made exclusively in Germany, but since the war efforts have been made in this and other countries to deprive Germany of that monopoly.

599. All kinds of glass before being ready for use have to be annealed, or to undergo some equivalent process for enabling them to stand ordinary usage at ordinary temperatures. If suddenly removed from the temperature of the glass-works into the open air, they would be so fragile as to break at the slightest shock. The process of annealing consists in cooling them slowly and equally, so that no difference of strain in different parts of the glass is brought about by differences of temperature. Since 1875 different processes of making hardened or toughened glass have been tried, and hard cast glass has been made in forms suitable for railway sleepers, tramway rails, grindstones, and floor-plates, the glass so treated being run into moulds made of a mixture which becomes heated and conducts heat at the same rate as glass. By using potash or soda in excess, a kind of glass can be made which is soluble in water, and this soluble glass, as it is called, is used for various purposes, among others as a protective coating against the action of the weather on calcareous building stones.

600. The invention of glass took place in prehistoric times. It

was known at a very early period in Egypt, but the oldest piece of transparent white glass of which the date is known is a vase found among the ruins of Nineveh and now preserved in the British Museum. It has inscribed upon it the name of Sargon, an Assyrian king who reigned about the close of the eighth century B.C. In ancient times the Egyptians and Phœnicians were the two peoples most noted for their glass-making, for which both Egypt and Phœnicia supplied excellent sand, the former near Alexandria, the latter in the bed of the small river Belus (now the Naman), which enters the sea near Acre. The alkali in Egypt was obtained from the Natron (soda) Lakes situated to the west of the delta. In Italy the making of glass does not seem to have been practised till about the beginning of the Christian Era, and there is no positive evidence of window-glass having been used there before the third century A.D. In modern times the Venetians first acquired celebrity for the beauty of their glass manufactures, the art having been practised there in some form or other from a date not long subsequent to the foundation of the city. Glass-making is now pursued on or near all the most productive coalfields. Belgium, which has local supplies of sand as well as coal, and manufactures soda compounds from imported materials (**603**), is the headquarters of window-glass manufacture in Europe, and also makes excellent mirror-glass. (See also **753, 888,** and **1302.**)

601. SOAP as a commercial product is a chemical compound resulting from the action of soda or potash on various fatty or oily substances, and hence, besides being an important commodity (unknown to the ancients) in its manufactured state, is the cause of a large trade in the various fats and oils that enter into its composition, as well as in the alkalies mentioned. Hard soaps are those made with soda ; soft, those made with potash. In the making of common yellow soap a large quantity of rosin (**466**) is added, and in the making of transparent soaps spirit is used. Glycerine is a bye-product of the soap manufacture. The fatty substances principally used in the manufacture of soap in the United Kingdom are tallow, coco-nut oil, palm (including palm kernel) oil, and cotton-seed oil ; but in the south of Europe the staple ingredient of this nature is olive oil, along with which are now used, in addition to the vegetable oils just mentioned, ground-nut oil, oil of sesame, and a great number of others (**453**). Even the grease from sheep's wool (**317**) can now be employed in this industry.

602. CHEMICAL INDUSTRIES. Of these only the most important can here be noticed, and only so far as to explain the large consumption of certain commodities. Details as to processes must be sought for in works on chemistry.

603. The commodities entered in the ‘ British Statements of Trade ’ under the head of alkali represent perhaps the largest of all such industries—namely, those concerned with the preparation of carbonate

of soda and caustic soda, which are chiefly used in the manufacture of glass (**600**) and soap (**601**). As usually made in Great Britain by the process known as the Leblanc process (patented in France in 1794), the materials employed are common salt, carbonate of lime (generally in the form of limestone), coal, and sulphuric acid. Common salt is in chemical language chloride of sodium—that is, a compound of the metal sodium with chlorine, which when free is a gas; and in order to be converted into carbonate of soda, the sodium, or rather the oxide of sodium, has to be brought into combination with carbonic acid. This union is effected by different stages. First, sulphuric acid is made to act on the common salt, by means of which sulphate of soda or salt cake and hydrochloric acid are obtained, the latter passing off as a gas. Next, the sulphate of soda is converted into carbonate of soda, and in this stage the burning of coal and carbonate of lime is necessary to furnish the carbonic acid. The product obtained is an impure carbonate of soda which is known as black ash and is sufficiently good for use in soap-making; but for the making of glass and some other purposes the carbonate of soda has to be purified. In the process of soap-making black ash is converted into caustic soda (a compound containing no carbonic acid) by treatment with quicklime.

604. This process or series of processes is now to a large extent superseded by another, called the Solvay process, in which common salt is converted into carbonate of soda by means of the carbonate of ammonium. A solution of ammonia is mixed with the salt, and carbonic acid then passed in as a gas. A further process enables the ammonia to be recovered and used over again. This method of making carbonate of soda is simpler than the first, and yields a soda highly valued by glass-makers for its purity. It has been very largely practised in Germany, to the injury of the older alkali manufacture of the United Kingdom.[1]

605. Potash, another of the alkalies largely used in the manufacture of glass and soap, as well as a number of other chemical industries, besides forming a valuable manure, was formerly mostly made by the burning of vegetable matter, and the chief exporting countries were Canada, Russia, and other timber-producing countries. In France it has long been made from the grease of wool, which is in general a waste product. (See, however, **601.**) After the discovery of the great deposits of potassic salts in central Germany (**835**), however, that country became the great source of supply. Subsequently important deposits were discovered in the south of Alsace and in the north-east of Spain, near Cardona. During the war efforts were made in various countries to extract it from different raw materials as from minerals

[1] The export of alkali from the United Kingdom reached its maximum down to 1900 inclusive in 1883, when it amounted to 347,350 tons. In 1900, the last year for which the quantity of this export is recorded, the total amount exported was 183,000 tons.

containing felspar. In the United States a variety of glauconite, occurring in a narrow strip in the states of Delaware and New Jersey, has proved a very important and promising source. Ferrocyanide of potassium is now an important by-product of the illuminating gas industry, being used either alone or along with potassium carbonate as the raw material in the manufacture of cyanide of potassium, which since 1890 has been more and more employed in the extraction of gold, either as a substitute for, or as a supplement to, the amalgamation process (**569**).

606. Sulphuric acid, which is employed in a great many industrial operations, but most largely in the manufacture of soda as above described, is chiefly made on a commercial scale from nitrate of soda (**1357**), and sulphur or iron pyrites, which is a compound of iron (often with more or less copper) and sulphur. The sulphur or iron pyrites is burned, and the resulting vapour acted upon (in leaden chambers) by nitric acid vapours obtained from the nitrate of soda, which is heated along with a quantity of the very acid (sulphuric) which the subsequent operations are intended to produce. Arrangements are made for recovering the nitric acid so that it can be used over again with little waste. Nitrate of potash (saltpetre) may be used instead of nitrate of soda, cheapness being the ground of preference. In more recent processes of manufacture, which are cheaper for the preparation of the very strong acids required in the coal-tar colour industries, and are now said to be cheap enough even for the more ordinary forms of the acid, the nitrates are not employed, but are replaced by platinum, in the presence of which the dioxide of sulphur is by a catalytic action more highly oxygenated through combination with the oxygen of water in the form of steam.

607. The hydrochloric acid obtained in the first stage of the manufacture of carbonate of soda by the Leblanc process (**603**) is utilised in the manufacture of bleaching powder, which is a compound of chlorine and lime. Manganese, in the form of the black oxide of manganese, is employed to free the chlorine from the hydrochloric acid, and the chlorine is then passed into chambers containing powdered slaked lime. Arrangements are made for recovering the manganese used in this process so as to use it again.

608. Sulphate of ammonia, a valuable nitrogenous manure, is one of the by-products of the destructive distillation of coal in gas-making, of the shale oil industry, and the manufacture of aluminium. (See also **612**.) Another important by-product of the same industry is coal-tar, which was at one time applied only to the same purposes as wood-tar, preserving ropes, timber, &c., but now yields an infinite variety of products of use in the arts. Some of these are employed to an enormous extent in the making of dyes of almost every hue. The first dye made from a substance extracted from coal-tar was a violet shade to which the name of mauve was given. It was accidentally discovered in 1856 by Dr. W. H. Perkin, in the course of an investigation made

with a different purpose, and was at once applied industrially in the celebrated dye-works of Messrs. Pullar at Perth. Soon other shades of a similar origin were discovered, and now almost all shades can be imparted to fabrics by means of dyes extracted from one or other of the products of coal-tar. At first this branch of industry was mainly carried on in Great Britain, the land of its birth, and the country most abundantly supplied with the raw material; but it is a noteworthy fact that in recent years the chief seat of the industry has been transferred to Germany. Probably there is no industry whose geographical distribution has been so much affected by the war as this. The reason is that important raw materials, such as benzol, toluol, carbolic and other acids, are required in the manufacture of modern high explosives as well as in the manufacture of dyestuffs, and this has caused this manufacture to be looked upon as one of the most important of key industries (**27**). The United Kingdom, the United States, and Japan are among the countries giving special support to it. In our own country this support has among other ways been given in the form of a debenture loan of upwards of one million sterling to one of the manufacturing companies.[1] (See also **753**.)

609. Alum, which is largely used in the sizing of paper, dyeing, calico-printing, painting and the preparation of colours, the tawing of leather and other industries, is prepared by several processes from clay or slate. In former days it was relatively much more important in the dyeing industry than now, on which account it had a very prominent place in the commerce of the middle ages.

610. Since 1892 an important industry has sprung up by the discovery in that year (almost simultaneously by Wilson in America and Moisan in France) that the carbide of calcium is formed when lime and carbon are fused together at the temperature of the electric furnace. It then became possible to manufacture cheaply the powerful illuminant acetylene gas, a compound of carbon and hydrogen which is formed by the action of water on calcium carbide. The carbon is mixed with the lime in the form of coke of the utmost attainable purity. The manufacture is carried on in Norway and Switzerland, though from these countries the great bulk of the product has to be exported, as well as in the United States, France, Italy, and Austria, in all of which there is a large consumption.

[1] About 1885 it was estimated that Germany produced on an average about six times the quantity of dyes from coal-tar produced in the United Kingdom; and what is still more striking, Germany derives from Great Britain a large proportion of the aniline and benzine, the two principal coal-tar products required as raw materials for the production of these dyes. The British industry inevitably received a great stimulus from the outbreak of the war, and within six years it had grown to such dimensions as to be producing at a rate exceeding the pre-war consumption in this country, where the products of industry are estimated to be required for goods of the value of £200,000,000. The British industry is still, however (Oct. 1920), unable to produce all the dyes and intermediate products necessary to the manufacture of dyes required by dyers.

611. Another important chemical industry of recent years is the manufacture of artificial silks. These, like the silk of the silk-worm, are made from some form of wood-fibre or cellulose. At one time sawdust was employed, but now cotton-waste is the material more generally used. By different processes a jelly is produced similar to the substance in the body of the silk caterpillar (**334**), and this by equable air-pressure is forced through glass tubes with orifices so minute that, just as in the reeling of silk, from ten to twenty of the fine filaments thus formed are united to form a single thread of silk. The first establishment for the carrying on of this industry was erected at Besançon near the forests of the Jura.

612. Still more recent chemical industries are the commercial manufacture on a large scale of oxygen, nitrogen and nitrogen compounds, and hydrogen, and the extraction of radium from pitch-blende or uranimite. Oxygen is now largely manufactured for various medical, scientific, and engineering purposes. Nitrogen is obtained from the air for the production of various nitrogen compounds used as fertilizers. In the great chemical works at Ludwigshafen it is now directly combined with hydrogen to form ammonia. The production of calcium cyanimide or nitrolim is associated in Norway and elsewhere with the production of calcium carbide, which when heated absorbs nitrogen from the atmosphere, and in the same country water-power is made use of to manufacture nitrate of lime, nitrate of ammonia, and nitrite of soda. Hydrogen is now largely manufactured to harden oils for the preparation of margarine and to enable low grade oils to be used in the manufacture of soaps. The pitch-blende used for the manufacture of radium is mainly obtained from Joachimstal in Bohemia, and other places on both sides of the Erzgebirge, but England has one source of supply, at St. Just in Cornwall.

613. Alcohol has long been manufactured in Germany and elsewhere for industrial purposes, chiefly from potatoes, but the development of the industry has been retarded in this country by fiscal regulations. These, however, have at last been removed, and it may confidently be anticipated that this industry will expand enormously in the future, not merely here, but elsewhere, especially in the warmer parts of the world, which are favourable to the production of sugar (**71**), or substances convertible into sugar, from which alcohol is readily made. The bulk of the raw material used as compared with that of the product will favour the establishment of the factories in the agricultural districts (**205**), and the use of alcohol as a motor spirit will probably offer an unlimited demand. In colder countries peat seems likely to furnish on a large scale material for the same industry.

614. MINOR MANUFACTURED ARTICLES AND MISCELLANEOUS PRODUCTS OF HUMAN INDUSTRY. Under this heading are mentioned those articles of human handiwork in the widest sense of that term which are of sufficient importance to be enumerated separately in the 'Annual Statements' of British Trade,

but which are not noticed in previous paragraphs. A few others are added which are of more importance in the trade of other countries than our own. Those articles which in recent years have reached an average value of one million sterling in the import or export trade of Great Britain are printed in black type, an I or an E being added in parenthesis after the name of the article to indicate whether it is the import or export that attains that value. Other articles are named in italics, and an I or E after the names of these indicates whether the import or export is in excess. Where neither letter is added there is no great excess on either side. The principal origin of imports or destination of exports is sometimes given, along with one or two other particulars of interest, but with regard to the products of British industry generally it is enough to say that most of them are very widely scattered among foreign countries and British possessions.

615. *Arms* and **Ammunition** (E.), the manufacture of which is chiefly centred in this country at Birmingham and Newcastle. *Bags*, empty (E.): the export of this article has greatly declined of late years, chiefly in consequence of the development of the jute industry in India (**439, 1058**). **Beer** (E.): beer is chiefly made from barley, and especially malted barley (**270**); but almost any kind of grain is capable of being used for the purpose, and hops (**300**) are employed to impart a bitter flavour. Among the imported beers specially named in the 'Annual Statements' are mum, which is made from wheat malt; and spruce beer, made from the leaves of the spruce fir. Saki, a kind of beer, made from rice, is an important article of local trade in Japan. *Biscuits and Bread* (E.). *Bleaching Materials*: see **607.** **Books** (E.), principally sent to Australia and the United States. Germany is the only country whose export of books rivals in value that of the United Kingdom. *Buttons and Studs not of metal* (I.). *Candles*: see **453, 462, 494** and **495, 498, 555, 556.** *Cement* (E.): the export under this heading is mainly hydraulic cement, so called because it hardens under water. It is made from lime, sand, and certain clays burnt. Two kinds differing in colour are distinguished in commerce, Portland cement and Roman cement, the former owing its name to its resemblance to a kind of limestone quarried, among other places, on the Isle of Portland in the county of Dorset. Finely powdered slate waste is said to form a higher grade of cement than any that has yet been placed on the market. Modern industry is constantly making greater demands for this product, largely for the making of concrete, which is cement mixed with gravel, and in building is often strengthened with steel rods (reinforced concrete), but the great bulk of the commodity in proportion to its value is adverse to its transport except by sea to great distances, and favours the development of the industry wherever the raw materials can be conveniently procured near any considerable market, such as is always offered in a rapidly growing community. It is a material whose use is affected by the climate and weather, inasmuch as it cannot be moulded in frost, and if moulded in cold weather must be carefully protected against frost till it is fully set. *Clay, Miscellaneous Manufactures of.* *Clocks* and **Watches** (I.), chiefly from France (to a large extent of Swiss origin—**788, 871**), Belgium, and the United States. *Confectionery.* Under this head the export is more than six times the value of the import, but this was not ascertained before 1900, the exports of confectionery having been previously to that year included under pickles. *Cordage, twine, &c.* There is a considerable import from the British East Indies; no doubt in consequence of the large use made of Manila hemp (**441**), coco-nut fibre (**444**), and other tropical materials in this branch of manufacture. *Embroidery* and *needlework* (I.), chiefly from Switzerland and Germany (**871**). **Farinaceous substances and manufactures thereof** (I.), chiefly from Germany and the British East Indies. *Fire-crackers*, a considerable export from China.

616. *Plaited goods* made from various materials form more or less important articles of commerce in several countries. *Baskets*, made chiefly from the twigs of various species of willow, are a speciality of German manufacture. *Wicker-work* of many kinds is made from *rattans*, the stems of various species of Calamus,

belonging to tropical Asia, whence they are imported, chiefly by way of Singapore. *Straw hats* and various other straw-plaited goods are a considerable export from Italy, and especially Tuscany, where that industry has existed since the sixteenth century. Spring wheat straw is used for the purpose, the wheat being sown thickly so as to grow long and slender stalks. In **Belgium** straw for plaiting is largely grown in particular districts with a soil very rich in lime, which imparts to the straw great suppleness, strength, and whiteness (comp. **800**). In **England, Luton** in Bedfordshire is the principal centre of straw-plaiting. It is also a leading industry in **China** and **Japan,** where plaited straw is made up into straw-braid for trimmings and exported in that form. In **Spain** plaited goods are made in large quantity from **esparto** (**311, 585**), and **Panama hats,** remarkable for their lightness, durability, and elasticity, are made from the midrib of the leaves of a kind of screw-pine (*Carludovica palmata*, Ruiz et Pavon), a native of the tropical forests of South America, whence they are largely exported to the West Indies, and even in some years in considerable number to Europe.

Flowers, Artificial (I.), mainly from France. *Furniture* (E.). *Hats* or *Bonnets* (E.). **Implements** and **tools** (E.), the export under this heading consisting to a large extent of agricultural implements. **Lace** and articles thereof (I.): there has been a large increase in this import since 1880, in consequence of improvements in machinery on the mainland of Europe. *Lacquered wares*, an important export from Japan (**1126**). *Lucifer matches and vestas* (E.): the British export of this commodity is exceeded by that of Sweden, the vast forests of which supply abundance of raw material; for the same reason there is a large export from Norway; China appears to have the largest import of this article (see also **1131**). *Mats and matting*, a considerable export from China, where rush or reed mats are a speciality. **Medicines** (E.). **Musical Instruments** (I.), chiefly from Germany, Holland, and France. **Painters' Colours** (E.): there is also a large import, chiefly from Germany, Holland, and Belgium. *Perfumery* (E.). *Pickles*, &c. (E.). *Pictures and drawings* by hand (I.), chiefly from France. *Plants, shrubs, trees and flowers, roots* (I.), chiefly from Holland. *Plate*, gold and silver: the foreign trade of trifling value. *Saddlery* and *harness*: see under **LEATHER** (**579**). Ships: see the Appendix. **Spirits** (I.). The total import of spirits into the United Kingdom varies in value between two and three millions sterling, against which there is an export of about the same value. The principal spirit imported into the United Kingdom is **brandy,** which is, properly speaking, the spirit distilled from wine, but is now made very largely from other liquors, a certain flavour being added by means of the lees of wine, dried fruits, &c. *Rum* is distilled from molasses and other juices of the sugar-cane or by-products of sugar-manufacture, and is hence mainly imported into this country from Guiana and the British West Indies. *Geneva* or *gin* is, properly speaking, a spirit distilled from grain and flavoured with juniper berries, and is chiefly imported from Holland. The true flavour is often imitated by means of oil of turpentine. Of the spirits not separately enumerated among the British imports the largest quantity comes from Germany, where potatoes are the raw material chiefly employed. The spirit of British manufacture chiefly exported from the United Kingdom is *whisky*, which is made for the most part in Scotland and Ireland from various kinds of grain, but chiefly from barley malt. Of the kinds of spirits which do not enter to any great extent, if they enter at all, into British trade, the chief are *arrack* or *raki*, and *slibovitz*, or *slivovitza.* The former is made from rice, and is a considerable article of export from the British and Dutch East Indies, the latter from plums, and is chiefly manufactured in the south-east of Europe: in Roumania, Serbia, and other countries adjoining the Lower Danube. The countries in which ardent spirits are most largely consumed are chiefly northern countries with a rather severe climate. In Russia the average annual consumption of spirits per head is estimated at nearly two gallons; in Scandinavia and Denmark this rate is approached or

exceeded; in Great Britain it has been in recent years about one gallon, notwithstanding the existence of a very high customs and excise duty on this commodity. Almost all Arctic travellers agree in stating that the natives of those regions are willing to do almost anything for a glass of spirits. See also **613.**

617. Stationery not paper (E.). *Tartar* or *argol* is a by-product of the wine-manufacture, being deposited on wine casks in the form of a hard crust. It is used chiefly for the manufacture of *tartaric acid*, which, besides being employed in the making of various effervescing drinks and for domestic purposes, is largely used in calico-printing as a means of preventing certain parts of the fabric from retaining coloured impressions. Tartar, the raw material, is chiefly exported from the wine-producing countries, but tartaric acid is most largely manufactured in Great Britain, the United States, and Germany. **Telegraph wires** and **apparatus** (E.), an export of very variable amount. **Toys** (I.), chiefly from Germany and Holland. *Umbrellas and parasols* (E.). *Yeast*, a by-product of beer-brewing, used to promote all kinds of fermentations and in baking, imported in the dry form under the name of German yeast.

EUROPE

618. Europe, the smallest of the continents, is, taken as a whole, the most densely peopled. In considering this superior density of population we must take into account the size of the continent, its situation and outline, and its history.

619. The difference in the size of Europe as compared with Asia makes it impossible for it to have such vast tracts as the latter continent, remote from the sources of moisture, the essential condition of fertility and cultivation, or rendered unfit for cultivation by the duration and the rigour of frost. The situation and outline of the continent are peculiarly favourable to its climate. The whole area, except a small fraction in the north, lies within the temperate zone, and the great irregularity of its outline causes it to enjoy in a higher degree than any other continent the mitigating effects of the sea on extremes of heat and cold (**52, 53**). Its westerly situation is of even greater importance in this respect (**55**), and its southern peninsulas have a peculiarly warm and equable climate, not only in consequence of the moderating effect of the Mediterranean Sea on the temperature, but also because these peninsulas are to a large extent protected from cold northerly winds by mountain-barriers on the north (**58**).

620. In temperate Europe there is the same increase in extremes of temperature from west to east as in other parts of the north temperate zone, and this is true to a certain extent even of the countries belonging to the Mediterranean region (**991**). Besides these peninsulas, or the greater part of them, nearly the whole of France and the British Isles, and the whole of Belgium and Holland, are outside of the area in which the mean daily temperature sinks below the freezing-point for at least one month in the year. On the other hand, the area in which the mean daily temperature is above 50° Fahr. for at least eight months in the year is almost confined to the Mediterranean region, although it includes also the west of France from about the Loire southwards. In the east of Russia the area in which there is at least one month with a mean daily temperature above 68° Fahr. extends as far north as the latitude of the Orkney Islands.

621. By far the greater part of the area of Europe has a sufficient rainfall for cultivation, so that south of the region in which the temperature puts a limit on agriculture, almost the whole of the lowland area, and even in the far south land at the height of between two and

three thousand feet, is capable of being tilled. The deficiency of rainfall prevents the pursuit of agriculture chiefly in the south-east of Russia (909) and in the interior of Spain (944). But though the rainfall is thus generally distributed, and occurs everywhere more or less all

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the year round, it is most abundant at different places during different seasons. The west, and above all the north-west, is the region in which autumn rains prevail, the east that in which there is a predominance of summer rain, but the Mediterranean peninsulas are the only region in which there is a marked deficiency of rain during any particular season. There the rains are chiefly winter rains, and the middle of summer is remarkable for its drought, to the south of about 40° N.

almost rainless (**99**). These winter rains are apt to be very violent and are blamed for the denudation of large areas, especially in the neighbourhood of some of the most populous sites of antiquity, where the needs of the population caused the mountain slopes to be stripped of their woods.

622. The great fact in the history of Europe which helps to explain the high density of population in that continent is the long duration of its advancing civilisation, together with the remarkably rapid strides taken within the last hundred years in consequence of the great mechanical inventions which have taken place in Europe. In civilisation, however, this continent was preceded by Asia and northern Africa (Egypt). In the earliest glimpses that we get of the commerce between western Asia and southern Europe we find the latter region supplying only the produce of their herds and forests—hides, wool, wood, wild honey, cattle and sheep, besides male and female slaves; and the articles received in return are ready-made clothes, iron and other metal tools, weapons, images, boxes of bronze and vessels of glass. The commerce thus carried on by Asia with Europe seems in fact to have been not unlike that carried on partly by Europeans, partly by Arabs, with the people of Africa at the present day.

623. Many of the cultivated trees and plants now thoroughly characteristic of certain parts of Europe are known or appear to have been introduced into that continent within historic times. The olive, the cypress, and the laurel, the evergreens now so characteristic of the Mediterranean peninsulas, and so well adapted to stand the dry summers of that region, seem all to be of Asiatic origin, though introduced at a very early date. The olive grew in Crete at least as early as 1500 B.C., and by the seventh century B.C. it began to clothe the hills of Sicily. Of Oriental origin also is lucerne, the equally characteristic fodder-plant of that region, the deep-rooted ally of the clover which survives the driest summers (**292**), and has hence been introduced into many other parts of the world with a similar climate to the Mediterranean. From Asia also came the fig, mulberry, almond, walnut, chestnut, and apricot, all before the birth of Christ. The mulberry of the ancients, however, was the black mulberry, the sycamine of the Greeks, the white mulberry (**334**) being a much later arrival from the East. From Asia likewise came at various dates, mostly after the beginning of the Christian Era, rice, cotton, and several members of the orange genus (citrons, lemons, and oranges proper); and after the discovery of America agaves and cactuses, potatoes, maize, and tobacco were added to the vegetation and agriculture of this continent.

624. The chief cereals of Europe, however, seem all to have been cultivated there in prehistoric times. Wheat and barley, as well as two kinds of millet, are proved by remains found beside the Lake-dwellings of Switzerland to have been cultivated in the later Stone Age; but the evidence of language would appear to show that many of our common

cultivated plants, including cabbages, peas, vetches, parsley, and onions, were introduced into cultivation in central and northern Europe directly or indirectly from Italy.

625. At the present day Europe is to a larger extent a manufacturing region than any other continent, but the predominance of manufactures is characteristic only of certain countries. As is shown by the tables in the Appendix, manufactured goods have a prominent place among the exports of native origin in the United Kingdom, France, Germany, Switzerland, and Belgium. In most other European countries the chief exports are still products of the soil, the forest, or the sea; but in the case of the Netherlands this cannot be definitely ascertained, owing to the manner in which the commercial statistics of that country are prepared. One of the most important facts in the commercial history of the continent within recent years is the extent to which its agriculture has been affected by the rapid development of commerce in grain with many parts of the world in which wheat and other crops are produced under exceptionally favourable conditions **(247-58)**.

Trade Routes through Europe to the other Continents of the Old World

626. The most important land routes connecting England with the Continent, used for passengers, mails, and perishable and valuable goods, necessarily start from London, and are interrupted by the sea. The outports on the shortest sea-routes are Dover and Folkestone, connecting England with France by Calais and Boulogne respectively. The Dover-Calais route is shortest of all,[1] being only 22 nautical miles as against 25 on the Folkestone-Boulogne route, but Boulogne has the advantage of being 27 statute miles nearer Paris. Dover also connects with Ostend (68) nautical miles. Other important outports are Harwich, from which steamers belonging to the Great Eastern Railway run to Antwerp (140 nautical miles), the Hook of Holland (the outport of Rotterdam, 101 nautical miles), and Esbjerg in Denmark (350 nautical miles); Newhaven, whence the London, Brighton and South Coast Railway runs steamers to Dieppe (76 miles) for Paris; and Southampton, from which the London and South-Western Railway runs steamers to Havre (122 miles), Cherbourg (98 miles), and St. Malo. Regular steamers also run in connection with the Chatham and South-Eastern Railways from Queenborough in the Isle of Sheppey to Flushing in Holland (108 miles), but this trade is reckoned as belonging to the port of London.

627. Paris is the great focus for the routes touching the coast of

[1] The construction of a tunnel under the Straits of Dover has frequently been mooted.

France at all the ports from Calais to Havre, the railway distances to that centre being from Calais by Boulogne and Amiens 185 miles, from Dieppe by Serqueux 104 miles, by Rouen 121 miles, and from Havre $141\frac{1}{2}$ miles. At Paris there is a break between the terminus of any of the main lines entering the city and any other, involving a journey through the city of about three miles to establish a connection between lines running in opposite directions.

628. From Paris two main railways proceed southwards, one passing to the west the other to the east of the Central Plateau. Of these two railways the western proceeds first south to Orléans, then descends the right bank of the Loire to Tours, there crosses the Loire, and continuing southwards by an ancient route up the valleys of the Vienne and Clain passes Poitiers and afterwards goes by Angoulême, Libourne, where it bridges the Dordogne, Bordeaux, where it bridges the Garonne, and Bayonne to the Spanish frontier at the west end of the Pyrenees. With a break of gauge (**941**) this railway connects Paris with Madrid (901 miles by the Segovia, 905 by the Avila, route) and Cadiz (1,428 miles), the port for Moroccan mails.[1]

629. The eastern of the two lines mentioned in par. **628** first runs south-eastwards up the valleys of the Seine, Yonne, and Armançon, then tunnelling Mont Tasselot between the Côte d'Or and the Plateau of Langres it descends on Dijon (197 miles). From this point it runs south to Châlon, and then keeping close to the right bank of the Sâone passes Mâcon and reaches Lyons. There it crosses to the left bank of the Rhone, and continues southwards in sight of the Cevennes on the right and the Alps on the left through Vienne, Valence, Avignon, and Arles. At Arles it leaves the Rhone and runs south-eastwards to Marseilles, a distance of 536 miles from Paris, 697 from Boulogne, and 724 from Calais.

630. From Tarascon a branch crossing the Rhone passes south-west through Nîmes and Narbonne to the east end of the Pyrenees, and there connects with the Spanish line to Barcelona and the towns of eastern Spain.

631. More important branches diverge on the east side of this route. First, from Dijon runs the line which now forms the shortest route to Milan (508 miles from Paris, 696 miles from Calais). This line runs south-east to Frasne, crosses the Jura, since May 1915 in a tunnel $3\frac{3}{4}$ miles long,[2] descends by Vallorbe to Lausanne, and then, following the Lake of Geneva and the valley of the Rhone to Brig, crosses the Alps in the Simplon tunnel (**867**), and descending the valley of the Rio Toce past Domodossola proceeds onwards by the south end of the Lago Maggiore to Milan.

[1] The construction of a tunnel from Tarifa in the extreme south of Spain to Ceuta in Morocco has been suggested.

[2] This tunnel, which has a summit level of 2,935 feet, effects a shortening of $10\frac{1}{2}$ miles on the former route.

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632. From Milan railways run west to Turin (155 miles), east to Venice (165 miles) and Trieste (320 miles; Calais to Trieste 1,027 miles, as against 1,116 miles from Ostend by Cologne, Frankfurt and Munich), south to Genoa (93 miles), and south-east to Bologna (135) and Florence (217 miles; from Paris by this route 736 miles).

633. Another branch runs from Dijon to Geneva[1] (354 miles from Paris), and another from Mâcon to the Mont Cenis tunnel. The Mont Cenis line first runs south-east past Chambéry across an easy water-parting between the valleys of the Rhone and Isère, then up the valleys of the Isère and Arc to the tunnel ($7\frac{3}{5}$ miles long; summit 4,380 feet), on the Italian side of which it descends the valley of the Dora Riparia to Turin. From Turin the line runs eastward along the southern base of the Hills of Montferrat to Alessandria, and thence to Piacenza, whence the route is due south-east through Bologna along the base of the foothills of the Apennines to Ancona, and then near the coast by Foggia to Brindisi. The distance from Paris to Brindisi is 1,169 miles (to Taranto 1,180 miles), from Calais 1,357 miles, and from London 1,460 miles. A branch from Alessandria runs south to Genoa, then skirts the Italian coast and passes through a large number of tunnels on its way to Pisa. From there one may diverge up the valley of the Arno to Florence (743 miles from Paris) and proceed by Arezzo, the Val di Chiana, and the valley of the Tiber to Rome and thence to Naples. A shorter route from Pisa continues right onwards through the Tuscan Maremme to Rome which is by this route only 902 and Naples 1,065 miles from Paris.

634. By the different railways which are all united at Dijon a great variety of products may be conveyed by rail to London with a short sea break. Among them are raw silk, silk wares, and other eastern products, the same commodities from Italy and the Rhone valley, dates from Algeria, fresh flowers from the mouth of the Rhone valley, watches and parts of watches from the Swiss and French Jura, French wines from Burgundy, gloves from the Grenoble district and Paris, and woollen manufactures from the north of France. The principal articles sent in the other direction from Dover, Folkestone, and Newhaven are woollen and cotton manufactures and apparel, besides goods sent through the parcel post and goods of foreign and colonial origin. For exports by parcel post Dover is the leading port of the country, followed by London (no doubt largely Queenborough) and Southampton. Colonial wool is more largely exported from Dover

[1] A project is at present being urged for the continuation of this railway by a tunnel through Mont Blanc to the Val d'Aosta (upper part of the valley of the Dora Baltea), and so to Turin, and another for the construction of an electrically-worked railway from Martigny at the sharp angle of the Rhone above the Lake of Geneva to pass under the Alps immediately to the east of Mont Blanc. The maximum gradient on this route would be 1 in 20. There is no line as yet across the Col de la Faucille, a few miles north of Geneva, which would offer the shortest route thither from Paris.

than any one article of British origin. Marseilles, Naples, Brindisi, and Taranto are all shipping and receiving places for eastern mails.

635. Less important than the main lines from Paris east and west of the Central Plateau (**628-9**) is the line which crosses the Loire at Orleans, and then goes southwards partly across the western spurs of the Plateau, or rather through them by numerous tunnels and deep rock cuttings, to Limoges, Montauban, and Toulouse (446 miles). At present there are no direct connections with Spain by means of this line. Three railways across the Pyrenees are designed to connect this town with the north-east of Spain, but the first of these to be completed makes a wide sweep south-west up the Garonne, then west to Pau before turning south to pass through the tunnel of Confranc (pierced 1912), and so down the Gallego valley to Zaragoza.[1]

636. What is known as the Orient Express route is that from Paris to Constantinople (**993**). It first runs up the valley of the Marne past Épernay and Châlons, then by the route of the Marne-Rhine canal past Nancy, across the north of the Vosges to Strasbourg. It then crosses the Rhine and runs 43 miles northwards along the base of the Black Forest, next passes eastwards to the Neckar valley, and after winding through the most fertile and populous part of that valley past Stuttgart, goes on to Ulm on the Danube. Thence it runs eastwards past Augsburg, Munich, and Salzburg, rejoins the Danube valley at Linz, and follows that valley past Vienna, Bratislava, and Budapest to Belgrade, beyond which the route is as described in par. **991**. The total length of the route to Constantinople is 1,949 miles (from London 2,237 miles), that from Paris to Salonica 1,726 miles.[2] The Anatolian railway (**1023**), beginning at Haidar Pasha, and running to Konia, may be looked upon as a continuation of this railway. It is on the same gauge, thus rendering possible the connection of the lines by a train-ferry. At Konia begins the Baghdad Railway, also on the standard gauge, which crosses the Taurus range to the north and east of the Cilician Gates, then descends to Adana in the Cilician plains, crosses the Amanus range in several tunnels and across several deep river gorges, and after bridging the Euphrates at Jerablus passes eastwards to Nisibin, and is destined to reach Baghdad by Mosul.[3] The

[1] The other two are—one ascending the Garonne and Salat, crossing the Pyrenees in about 1° 10′ E. to the valley of the Noguera Pallaresa, which joins the Segre north-east of Lerida, and the other crossing the Col de Tosa in Spain about 2° E. to the valley of the Congost, which descends nearly due south to Barcelona.

[2] A shorter route that might be completed to Constantinople, by the Simplon Pass through North Italy and then to the north-east of Italy crossing the Pear Tree Pass, just under 2,900 ft. in height between Gradisca and Laibach (Ljubljana) and connecting with Belgrade by the Save valley, is described by Sir Arthur Evans in the *Geog. Journ.* vol. xlvii., pp. 241–61. The author estimates that it would shorten the journey from London to Constantinople by 5½ hours.

[3] At the close of the war (Nov. 1918) only about 200 miles of this railway between Nisibin and Tekrit remained to be completed.

ultimate destination of this railway is Basra, which during the war was converted into a first-class port, but to reach this port the railway goes to the Euphrates bank, down which it already reaches as far as Hilla, near the ruins of ancient Babylon, and thence it will proceed eastwards to Kut, which is already connected by rail with Baghdad, and thence southwards along the Hai branch of the Tigris to Nasariye, to which a narrow gauge railway runs from Basra. A branch from this line runs south to Alexandretta (since 1914), and another by Aleppo to Damascus, whence one railway on the gauge of 3 ft. $5\frac{1}{4}$ ins. runs south-east of the Jordan to Mecca, and another west of the Jordan has been connected since about the end of 1918 with the Nile valley railways, crossing the Suez Canal by a bridge at El Kantara. A metre gauge railway has connected Baghdad with Basra since January 1920.

637. To Milan, Genoa, &c., there are express routes through the St. Gothard Tunnel by Calais, Ostend, Flushing, and the Hook of Holland. From Calais the route is by Amiens, Laon, Reims, and Châlons, then up the valley of the Marne, across the Plateau of Langres, then south of the Vosges to Basel, and thence by Lucerne to the St. Gothard tunnel (**867**), down the valley of the Ticino, across the Lake of Lugano, and finally by Chiasso (Italian frontier station) and Como to Milan. The whole distance by this route from Calais is 756 miles, against 707 miles by the Simplon route (**867**).

638. From Ostend to Milan the route is first eastwards through the plains of Belgium, past Bruges, Ghent, and Brussels to Liège, then across the margin of the hilly country of Belgium and western Prussia past Aachen to Cologne. From here it runs up the gorge and valley of the Rhine either on the left or the right bank. The left bank route is by Bonn, Coblenz, Mainz, Strasbourg, and Mülhausen to Basel, the other by Wiesbaden, Frankfurt, Karlsruhe, and Freiburg-im-Breisgau to Basel, beyond which the route is the same as that from Calais. The distance from Ostend to Milan by the left bank of the Rhine is 782 miles (from Antwerp 717 miles), by the right bank 795 miles (from Antwerp 730 miles). From Flushing and the Hook of Holland the routes are the same beyond Cologne. From Flushing to Cologne the route is nearly due east to Wesel, then up the Rhine, and the distance to Milan is 567 miles by the left bank, and 580 by the right. From the Hook the route to Cologne is by Rotterdam, Dordrecht, Nijmegen, and Cleve, and the distance to Milan by the left bank of the Rhine is 751 miles, right bank 764 miles.

639. By these routes are conveyed to London Italian eggs, Italian, Swiss, and German silks, Italian, French, and Rhine wines, Swiss embroideries and other cotton manufactures, condensed milk, cocoa and chocolate, and large quantities of butter and fresh meat.

640. The Ostend-Vienna express route is the same as the Ostend route to Milan as far as Mainz, then up the Main valley to Frankfurt, thence south-eastwards between the highlands of the Spessart and the

Odenwald, and across the Franconian Heights to Nuremberg, and onwards to Ratisbon, Passau, and Linz, all three on the Danube. Beyond Linz the route is the same as that of the Orient Express (**636**). The distance from Ostend to Vienna is 832 miles, from Antwerp, by the same route from Louvain, 767 miles.

641. To Berlin there are express routes from the same four ports as to Milan, by the St. Gothard, namely, Calais, Ostend, Flushing, and the Hook. The shortest railway journey is that by the Hook, but the quickest from London in time is that by Ostend. This is what is called the Nord (North) Express route. To Cologne it is the same as that to Milan, but from Cologne it is either down the Rhine for 24 miles to Düsseldorf, and thence by Soest and Magdeburg to Berlin (572 miles from Ostend), or down the Rhine for 44 miles to Oberhausen, and thence by Hamm and Hanover to Berlin (576 miles). From Flushing the route is the St. Gothard route to Oberhausen, and the total distance to Berlin is 477 miles. From Calais the route is by Lille to Brussels, from which point the route is the same as the Ostend route with the same alternatives from Cologne, the distances being 635 miles by Magdeburg and 639 miles by Hanover. From the Hook the route is by Rotterdam, Utrecht, Amersfoort, the Dutch cotton manufacturing towns of Almelo and Hengelo, and thence to Osnabrück and Hanover, the distance to Berlin being 432 miles.

642. The Esbjerg route from Harwich is a quick route to Copenhagen and the south of Sweden. Train-ferries carry sleeping-cars across the Little Belt from Jutland to Funen (Fyen), and across the Great Belt from Funen to Seeland and Copenhagen, and also across the Sound to Malmö. By this route large quantities of bacon, butter, eggs, and other Danish produce are brought to London.

643. Berlin is the most important railway centre of the continent east of Paris. With the two ports of Stettin and Hamburg it is connected by the easiest possible railway routes running across plains unobstructed by any important river, the railway to Stettin, 83½ miles, that to Hamburg, 178 miles long. By way of Warnemünde, 140 miles from Berlin, a train-ferry connects Prussia with Gjedser in the south of Seeland in Denmark, and through Denmark with Sweden by the Copenhagen-Malmö train-ferry. In July 1909 a direct train-ferry from Sassnitz on the island of Rügen, 170 miles from Berlin, to Trelleborg in the south of Sweden, a distance of 65 nautical miles, was inaugurated.

644. From the nearest Adriatic ports Berlin is separated by the Alps, the windings through which lengthen the railway distance to Venice, by the Brenner route, to 761 miles, that to Trieste, by Vienna (446 miles) and the Semmering route, to 816 miles.

645. In 1906 a shorter connection between Vienna and hence between Berlin and Trieste was opened for traffic. This is the same as the old (Semmering) route as far as Bruck at the junction of the

Mürz-tal with the Mur-tal, but from this point it continues south-west instead of turning to the south-east. It then goes on to Klagenfurt, and afterwards by tunnels through the Karawanken and the Julian Alps to the Isonzo valley, which it descends to the Gulf of Trieste. The aggregate length of the tunnels in the Karawanken is nearly five miles, and the longest tunnel through the Julian Alps is nearly five miles long.

646. This new Bruck-Trieste line also shortens the distance between Trieste and Steyr in Upper Austria, and with the aid of other Alpine tunnels is made use of to shorten the distance between that port and other industrial regions farther west. In 1909 a railway passing through a tunnel, piercing the eastern end of the Hohe Tauern, with a length of 5·3 miles and a summit level of 4,020 feet, effected a connection nearly due south of Salzburg between the great east-west lines of Bruck-Innsbruck and Marburg-Franzensfeste. This makes a great reduction in the sea-distance of Salzburg, and shortens to a less extent the distances between Trieste and places in south-west Germany. Farther east and north another trans-Alpine railway, the Pyhrnbahn, traversing the Bosruck tunnel south of Linz leading to Selztal brings about a shortening of the distance between Trieste and Linz, and through Linz with Budweis, Prague, and towns farther north.[1]

647. The principal eastern lines from Berlin are one running north-east to Petrograd, one running east to Warsaw and Moscow, and one running south-east to Breslau (203 miles), Cracow (367 miles from Berlin), Lemberg (580 miles from Berlin), and Odessa (1,040 miles). To Galats on the Danube the distance is about the same. The Petrograd and Moscow routes both have connections with the Siberian

[1] The figures below show the effect of these shortenings:—

Vienna—Trieste.

Old route by Laibach (Ljubljana)—370 miles.

New route by Klagenfurt, the Karawanken, and the Isonzo valley—321 miles.

—	By Vienna and Laibach	By Budweis, Tarvis and Laibach	By Budweis, Tarvis and Udine	By Budweis and the Karawanken	By Linz, Selztal and the Karawanken
	Miles	Miles	Miles	Miles	Miles
Trieste to Prague .	587	584	541	542	485
,, Dresden	706	703	660	661	604
,, Berlin .	816	813	770	771	714

—	Old route by the Brenner, Tarvis and Udine	By Hohe Tauern Tunnel and Karawanken	By Salzburg and the Hohe Tauern
	Miles	Miles	Miles
Trieste to Salzburg . .	433	257	—
,, Munich . .	418	—	352
,, Leipzig . .	717	—	651

railway (**1012**). The railway to Petrograd crosses the Oder at Küstrin and the two arms of the delta of the Vistula at Dirschau and Marienburg, then runs north-east to Königsberg, thence eastwards to Vilna, and finally north-eastwards past Dvinsk (Dünaburg) to Petrograd—a distance of 984 miles, or 1,602 miles from Ostend, 1,416 miles from the Hook.

648. From Berlin to Moscow there are two routes, one the same as that to Petrograd as far as Schneidemühl, then eastwards by Bromberg to Thorn, the other crossing the Oder at Frankfurt, and proceeding thence by Posen to Thorn. From Thorn the line goes on to Warsaw, where the Vistula is crossed, after which it runs to Moscow by Smolensk, the distance from Berlin being 1,200 miles. From Moscow to Chelyabinsk the route is by Samara and Zlato-ust, and the distance is 1,311 miles, so that the whole distance from Berlin to Tairen is about 6,670 miles.

649. The central situation and large population of Moscow have inevitably made it a very important railway focus. Its nearest port is Petrograd (400 miles). Other important outlets on the Baltic are Riga (by Smolensk, 643 miles) and Windau (in Russian Vindava, 680 miles). Sevastopol (960 miles), the nearest port on the Black Sea, is now exclusively a naval port. Odessa is connected with it by two routes almost equal in length (about 1,030 miles), one by Kursk and Kief, the other by Kursk, Kharkof, and Elizavetgrad.

650. Of international inland waterways in Europe by far the most important is the Rhine (**827**), and next in importance in respect of volume of traffic are those connecting northern France with western Belgium. Among the canals that link up great rivers those which look most imposing on the map are perhaps the Ludwig's Canal connecting the Main and Danube,[1] and the Rhone and Rhine Canal, but the traffic carried on both of these is quite insignificant. Much more important is the Rhine and Marne Canal, which carries considerable quantities of coal in both directions and some thousands of tons of wheat and iron ore from France into Germany.

651. The Danube itself is an important international waterway. It is navigable by steamers from Ulm downwards, and for barges of 1,000 tons from Ratisbon to Turn Severin, and from that point for sea-going vessels (**884**), a total length of upwards of 1,500 miles, but the navigation is subject to the drawback of interruption by fixed or floating ice for about two months in the year. But there is a still more serious disadvantage in the character of its banks, especially below Budapest, these being so marshy as to afford comparatively few sites for towns (comp. **1276**). To these causes may, in a large measure, be ascribed the fact that in pre-war days the total tonnage of traffic

[1] It is now proposed to deepen the Main from Würzburg to Kitzingen and thence to make a connection with the Danube above Ratisbon navigable throughout this stretch by vessels of 1,000 tons.

at Vienna was less than one-tenth of that of the Seine at Paris (**772**).[1]

652. Various projects for connections along routes that seem to offer the prospect of heavy, bulky traffic of the kind suited to inland waterways are at present under consideration. One of these, shown on the map of the Waterways of Central Europe, is designed to establish a better connection between the Rhine and Danube than that by the Ludwig's Canal. But this connection would be very costly to establish, and there now seems to be a better prospect of effecting this object by an easier though longer route. By this scheme the Main is to be regulated and deepened or in its place lateral canals to be constructed from Aschaffenburg, west of the Spessart, to a point near Bamberg, from which point a canal is to run southwards, passing to the east of Bamberg and then to the west of Forchheim and Nuremberg, and, after crossing its summit level, 1,330 feet, near Hipolstein, to reach the Danube by the valley of the Altmühl, like the Ludwig's Canal, close to Kelheim. The part of this route following the Main will be made available for barges of 1,500 metric tons, the canal thence to the Danube for barges of 1,200 metric tons. The aim of this new route is less to serve for local traffic, which explains the avoidance, to save cost, of the towns mentioned, than to bring the industrial region of the Ruhr basin into connection with the agricultural regions of the lower Danube and the Black Sea. It is expected that the annual costs of the route will be defrayed from the returns on the water-power created —an added advantage to be noted as favouring the construction of canals across high water partings since the development of the methods of applying power by electricity. (Comp. **1247**). The summit is 575 feet above the Main near Bamberg, 975 feet above its level at Aschaffenburg, 1,105 feet above the Danube at Kelheim.

[1] Attempts are now (1921) being made to develop the traffic of the river. The whole of its navigation from Ratisbon downwards has been brought under the control of a single company, the Anglo-Roumanian Danube Navigation Co., which maintains a daily service between Vienna and Budapest.

THE BRITISH ISLES

653. The British Isles lie in the north-west of Europe, between the parallels of 50° and 60° N. To be more precise, the fiftieth parallel of latitude runs a little to the north of Lizard Point in Cornwall and the Scilly Isles, and the sixtieth through the southern end of the mainland of Shetland.

654. Surface. England. Of the countries which make up the British Isles England is that which has the greatest proportion of the surface available for production or purposes subsidiary to production. According to the most recent agricultural returns, more than three-fourths of the entire area of land and water was under crops or grass or lying fallow, and when it is considered that about $4\frac{1}{2}$ per cent. of the surface was occupied by woods, and that a large area is taken up by towns, factories, roads, and railways, it will be seen that the area occupied by unproductive hill and moorland is very small indeed.

655. The hills and mountains of England are chiefly in the north and west. The Cheviot Hills with their broad spurs, and the tablelands of the Pennine Chain, 'the backbone of England,' as it has been called, which runs from north to south from Cumberland into the heart of Derbyshire, cover a considerable extent of ground, and, though almost entirely productive, are fit, so far as agriculture is concerned, for little else than sheep-pastures, so that in these districts the population is even now very sparse, except where manufactures are carried on. Other extensive tracts with a poor soil for agriculture lie in the south-east, chiefly in the districts covered with chalk hills and downs—Salisbury Plain and the Marlborough Downs in Wiltshire, the North and South Downs, the Chiltern Hills, the tableland of Northamptonshire, and the Yorkshire Wolds in the East Riding. If England depended upon agriculture alone or mainly, the existence of these and other tracts would always tend to keep down the average density of its population.

656. But in view of the nature of the chief industries of the country, it is a matter of more importance that the high grounds of England interfere comparatively little with the **facilities for locomotion.** On all sides there flow down from the hills navigable rivers of greater or less length. In relation to internal communication the most important

of these are the Ouse (Yorkshire), Trent,[1] and Mersey, the Thames and the Severn with their tributaries. The Ouse is navigable for barges throughout its length, and its most important tributaries are navigable likewise or have been canalised[2]; and so little of a barrier to communication is presented by the Pennine Chain that three lines of canals have been laid across it, bringing the ports of Goole and Hull on the east into connection with those of Liverpool and Preston on the west. By the valley of the Aire a canal, which has a branch to Bradford, ascends by way of Leeds and Skipton, crosses the watershed at a height of only 477 feet, and descends on the Lancashire side by way of Burnley and Blackburn to Preston. By that of the Calder another line of canals ascends by way of Wakefield and Halifax, to descend by Rochdale to Manchester, where the Irwell becomes navigable. The third canal forms a more direct communication between the opposite sides of the Pennine Chain, but rises to a greater altitude. It joins Manchester with the Calder Canal by way of Ashton and Huddersfield. Its summit is at the height of 656 feet, and the crossing even at this altitude was effected only by piercing the Stanedge Tunnel, more than three miles in length.

657. From these particulars it might be inferred as a matter of course that canals in the lower regions of England are even more numerous, which is in fact the case. The Trent, the Mersey, the Thames, and the Severn are all interconnected by inland waterways, natural or artificial. The Trent itself is navigable for small sea-going steamers as high as Gainsborough, the Thames for vessels of two hundred tons as high as Hampton, and the Severn for vessels drawing six feet as high as Stourport. The Berkeley Ship-Canal, which connects Gloucester with the estuary of the 'sandy-bottomed Severn,' enables vessels drawing more than ten feet to ascend to that town, avoiding the windings and shallows of the river.

658. The canals of England are mainly works of the latter part of the eighteenth[3] and the early part of the nineteenth century, and at the period when they were made were of very high importance for the development of English industry and commerce. Since railways were introduced (**137**) their value has been considerably diminished. They are still not without importance for the carriage of minerals and other bulky commodities, but even in the carriage of coal they are unable to

[1] In 1915 the city of Nottingham obtained an Act empowering the corporation to make the Trent navigable for barges of 200 tons as high as the town, but the carrying out of the work was delayed by the war.

[2] The Great Ouse is now bring cleared, dredged, and having its banks made up. The area which this will improve is nearly half a million acres. The Yorkshire Ouse will be the next to be improved. The work is to be carried out by the Board of Agriculture, under the *Land Drainage Act* (1918).

[3] The Bridgewater Canal, constructed under the direction of James Brindley, was completed in its eastern section (from the Earl, afterwards the Duke of Bridgewater's coal-mines at Worsley to Manchester) about the end of 1761, but was not connected with the Mersey till 1776.

compete with railways except where the conditions are exceptionally favourable to this mode of transport. What specially favours the Aire and Calder Navigation in its use of the compartment boats described in par. **187** is the fact that such boats can be used for the whole or nearly the whole distance between the coal mines and the place of shipment at Goole. The greater the proportion of the tract of cheap haulage, the greater is the advantage.

659. Since the publication of the first edition of this work two blue-books have appeared [1] giving numerous particulars with regard to our own canals, and showing that at that date (1889) exaggerated and erroneous statements were current as to the causes affecting our canal traffic, and a Royal Commission on the Canals and Inland Navigations, appointed in 1906, has sat and reported. The publication of these reports has not yet put an end to the currency of such statements. In 1889 it appeared to be a generally admitted fact that we had been to a large extent deprived of the advantage of our canal system through the fact that most of them had come under the control of railways, which had deliberately discouraged traffic on the canals so acquired. The blue-books showed the first of these statements to be greatly exaggerated. In the case of England and Wales the figures in 1888 and 1898 were as follows :—

	1888.	1898.
Railway-controlled waterways . . .	1,024 ..	959
Independent waterways	2,026 ..	2,208

In the fourth volume of the Report of the Royal Commission [2] other figures are given, but as various navigations not recognised in the previous returns are included in the new ones these figures, given below, are not comparable with the earlier ones :—

	Miles.
Independent waterways	3,310
Waterways belonging to railways	1,145
Waterways controlled by railways. . . .	218

Our map of the English waterways, based on the reports for 1888 and 1898, shows that some of the independent lines are on some of the most important routes in the kingdom—two, for example, between south Lancashire and Yorkshire, two from the midlands to London. Of the two independent waterways crossing the Pennine Chain, the northern, the Aire and Calder Canal, paid in 1888 a dividend of 2·92 per cent., in 1898 one of 3·2 per cent. on the ordinary stock ; the southern, the Rochdale Canal, paid in 1888 4·7 per cent., in 1898 1 per cent. ; of those leading from the midlands to London, the most important, the Grand Junction, paid both in 1888 and 1898 4 per cent. ; not extravagant dividends, in any case not such as to attract capital for the re-acquisition of canals by private companies from railways. Yet an important

[1] *Returns to the Board of Trade in respect of Canals and Navigation*, [C—6083] 1890, and [Cd.—19] 1899.

[2] [Cd. 3719] of 1908.

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experiment of this nature was actually made between 1888 and 1898. On March 1, 1895, the River Dun Navigation, the Dearne and Dove Canal, the Sheffield Canal, and the Stainforth and Keadby Canal, jointly connecting Sheffield, Rotherham, and Barnsley with the Humber through the Ouse and the Trent, and having an aggregate length of 59½ miles, were transferred from the Manchester, Sheffield and Lincolnshire (now the Great Central) Railway to a private company. In 1898 that company paid only ¼ per cent. on its ordinary stock, though it paid 4½ per cent. on the preference stock, which formed nearly 60 per cent. of the capital.[1]

660. With regard to the allegation that railways deliberately strangle the traffic of canals of which they have acquired the control, it is difficult to see the motive for this. If there is really an economy in using their own waterways, why should they not use them? In fact, the canals that carry the greatest amount of traffic in the United Kingdom, the Birmingham Canals, are practically under railway control, though they keep separate accounts and form a separate company. Both in 1888 and 1898 they paid 4 per cent. on the ordinary stock under the guarantee of the London and North-Western Railway Company. (See also **147-151.**)

661. In their general report[2] the Royal Commission above mentioned recommended that a Central Waterways Board of three or five paid commissioners should be appointed, and that to that board should be handed over the administration of the present government canals, the Caledonian, and the Crinan in Scotland, and also four great trunk canals, which, along with certain branches, they advise should be constructed by the state. (See the map on p. 302.) Acting under instructions of the Royal Commission, Sir John Wolfe Barry and Partners have since reported on the cost of those works,[3] the nature of which will be to some extent seen from the following particulars :—

Estimated Cost in Millions Sterling and Two Decimals of a Million of Constructing Inland Waterways.

	For Barges of 100 Tons.	For Barges of 300 Tons.
1. Brentford to Birmingham	£4·17	£7·44
Bull's Bridge Junc. on this canal to Paddington Basin and Limehouse Dock .	1·11	2·51
	5·28	9·95
2. Norton Junction on to Leicester, Nottingham, and the Humber	2·23	3·76

[1] In 1900 and 1901 no dividend was paid on the ordinary stock. The total amount of traffic carried by the canal in 1888 was 927,254 tons; in 1898, 982,730 tons; but in 1900 it had sunk to 894,497, and in 1901 to 858,150 tons.

[2] [Cd. 4979.]

[3] Vol. ix. of the Report of the Royal Commission [Cd. 5083] of 1910.

	For Barges of 100 Tons.	For Barges of 300 Tons.
3. Birmingham to the Potteries and the Mersey	£2·56	£4·89
Fradley Junction to Trent Junction	0·67	1·26
Haywood Junction to Wolverhampton and Aldersley Junction	0·49	0·91
	3·72	7·06
4. Birmingham to the Severn (Sharpness)	1·34	2·56
Diglis Basin (Worcester) to Aldersley Junction	0·92	1·39
	2·26	3·95
Grand Total	£13·49	£24·72

The route from Birmingham to the Severn in the estimate given above passes to the south of Droitwich. A slightly longer, but easier, route passing through Droitwich is estimated to cost £8,000 less for the 100-ton and upwards of £13,000 less for the 300-ton barge.

The 100-ton waterways are generally designed to have a depth of 7 feet, taking barges of 5 feet draught, but on the second trunk canal, the estimate provides for barges of 120 tons from Nottingham downwards, and locks on this portion of the waterway accommodating four such barges at once. On the third trunk canal the Weaver Navigation, which already admits larger barges than the proposed waterway is designed for, is made use of in its last 9½ miles, from Northwich and the Mersey, and on the fourth waterway and its branch the estimate provides for the accommodation of barges of 600 tons as high as Stourport.

The estimates are exclusive of parliamentary, legal, and engineering expenses, which last head apparently comprises water-supply, for where details are given the cost of this is also expressly excluded. They likewise leave out of account the cost of acquiring the existing waterways as well as various expenses incidental to the working of the traffic.[1]

662. In recent years one large ship-canal has been constructed (**726**). Several projects for ship- or larger barge-canals were subsequently started (Bristol to the Severn, Sheffield to the Humber, the North Staffordshire potteries to the Mersey), but they have been mostly abandoned. The railways and canals of the British Isles all belong to private companies,[2] but are to some extent under the control of a

[1] See, besides the Reports referred to, E. A. Pratt, *British Canals*, London, 1906; Urquhart and Forbes, *Our Waterways*, London, 1906; and an article by A. B. Firth on 'Water Transport or Rail,' in the *Fortnightly*, April, 1910.

[2] By the scheme of the Transport Ministry (June 1920) the management of the railways will be retained by the eleven great companies under government supervision in the interests of the community; the country will be divided into minor areas, each under a Joint Committee to secure efficient cross-country services; and railway facilities at ports will be independent of individual company interests. The 121 companies which leased the track they owned to the large companies will be eliminated to promote co-ordination and remove unnecessary competition.

commission appointed under an act passed in 1888. Among other provisions of this act is one prohibiting any railway company, director

THE FOUR TRUNK INLAND WATERWAYS PROPOSED BY THE ROYAL COMMISSION ON CANALS AND INLAND NAVIGATIONS.

or officer of a railway company from using any of the company's funds, without express statutory authority, to acquire any interest in a canal.

What has been said regarding the construction of canals

implies that in railway construction the obstacles presented by the physical features of the country were of still less consequence relatively to the much higher value of the new means of transit. In view of the distribution of population, the most serious hindrances to railway communication are those presented by the Pennine Chain in the region already referred to under the head of canals, and those on the routes connecting the most populous parts of England with the most populous parts of Scotland. There are now railways on all the canal routes above mentioned. Farther south Manchester and Sheffield are connected by a line passing through the Woodhead tunnel, which is only a few yards shorter than the Stanedge and attains an altitude of over 1,000 feet. On the northern routes the chief connection between Lancashire and the valley of the Eden is now, as it always has been, by way of Shap Fell, where the summit level of the rails is 916 feet above sea-level; that between the West Riding of Yorkshire and the same valley reaches between the head-waters of the Ribble and Lune a height of 1,250 feet. The next high crossings on the northern routes are all in Scotland. In Monmouthshire serious hindrances to communication are presented by the high ridges separating the populous coal-mining and iron-working valleys in the west, more than one railway having to climb to an altitude of more than 1,200 feet within a short distance, involving gradients up to 1 in 45. Obstructions to communication presented by water have been overcome by low-level tunnels at the mouths of the Severn and the Mersey, and under the Thames at several places in London.[1] The Severn tunnel, below Chepstow, the longest in the British Isles, is 4½ miles long. It was opened in 1886.[2] With reference to natural facilities for communication it is also noteworthy that the outline of England encourages railway construction, for it is obvious that the value of a railway, even for inland communication, is much enhanced by being connected with a seaport.

663. Plans for the electrification of railways had before the war been adopted by the main companies, especially for London suburban lines. Since the war the electrification of main lines has engaged attention. Proposed schemes favour a uniform direct current system with standardized wagons, rolling stock and equipment. The London, Brighton and South Coast electric lines use a one-phase alternating current system which would shut off the company from through running facilities. In Scotland the electrification of the Highland railway between Perth and Inverness has been proposed. Power derived from

[1] During the war, train-ferries operated between Richborough and Calais, and Southampton and Dieppe. The Richborough installation has since come into private hands, and on the 11th of October, 1921, the first commercial train conveyed by ferry, bringing about 300 tons of fruit from the South of France, arrived here. A proposal to establish a steamship train-ferry between the Humber and Sweden is under consideration.

[2] A proposal to tunnel the Humber, thwarted by an adverse vote of a Committee of the House of Lords in 1873, was revived in 1907, but has not (1920) materialised. Hull would thereby be brought half-an-hour nearer London.

Lochs Ericht, Laidon, Rannoch, and Tummel would also stimulate industrial developments along the route. On the 18th of August, 1921, the first station of an imperial wireless chain designed ultimately to establish communication between Great Britain and British Africa, India, Singapore, Hong-Kong, and Australia, was inaugurated at Leafield, about eight miles west of Woodstock, Oxfordshire.

664. In Wales the proportion of hilly and mountainous country is much greater than in England, and the area of land under crops or grass or in bare fallow is rather less than three-fifths. The ranges of the Welsh hills are, however, short, and there are many openings allowing an easy passage for railways.

665. Surface, Scotland. Scotland is the most mountainous part of the British Isles, and its northern half has hills and mountains so closely packed together, that even yet there are few roads leading through the narrow and sparsely peopled valleys between them (**136**). Long the only road across the Grampians—that is, the mountains lying immediately to the north of the central lowlands—was that which leads up the valley of the Garry, a tributary of the Tay, and after crossing the Drumouchter Pass at the height of 1,484 feet, descends a tributary of the Spey to the valley of that river. This road is now accompanied by a railway, which is continued near the east coast to the most northerly towns of the country (Wick and Thurso). Of the surface of Scotland less than one-fourth is under crops or grass or in bare fallow, and the greater part of the land suitable for cropping is confined to the area already referred to as the central lowlands, an area roughly definable as bounded by two parallel lines, one stretching from Stonehaven in Kincardineshire to the Firth of Clyde opposite Greenock, the other from Dunbar in Haddingtonshire to the middle of the Ayrshire coast. In this lowland area there lies, moreover, most of the great mineral wealth of Scotland, and therefore most of its manufacturing industry; so that this region, which has at all periods of Scottish history been the most densely peopled part of the country, now contains a greater proportion of the population than ever. Here, consequently, the Scottish railways are most closely laid, and through its southern valleys wind several railways connecting it with the lowlands on the other side and with England. The lowest of all these routes, that forming the shortest connection with England, is that by the east coast, which has nowhere to rise as much as 500 feet above sea-level. The next route, on the west, has first to climb to above 900 feet between Edinburgh and Melrose, and then to about 1,000 feet in crossing in a tunnel a spur of the Cheviots between Hawick and Liddisdale, where the main line descends to the Solway, and a branch passes eastwards to the head of the valley of the North Tyne. A still more westerly route connects both Edinburgh and Glasgow with Carlisle, crossing, between the valleys of the Clyde and the Annan, an altitude of 1,028 feet. By winding far to the west, through Kilmarnock,

a fourth line effects a crossing at a little more than 600 feet in height in passing from the valley of the Ayr to that of the Nith. Two easy east-west routes are provided through the lowlands of Scotland, one connecting the Firth of Forth with the Clyde by the valleys of the Carron and Kelvin, the other by the Tweed, which is separated from the Clyde valley a little above Lanark by only a very low water-parting, and thence going by the Douglas and Lugar Waters to Ayr. The chief obstructions to communications offered by water in Scotland are overcome by means of two of the most remarkable railway bridges in the world, the Tay bridge at Dundee, the longest of all (3,593 yards, or a little more than two miles), opened in 1887, and the Forth bridge at Queensferry, a few miles above Edinburgh, 2,765 yards, or more than a mile and a half long, opened in 1890.

666. The most important of Scottish canals is the Forth and Clyde Canal, which enables small sea-going ships to pass from Grangemouth on the Firth of Forth to a place on the Firth of Clyde a little above Dumbarton. This canal, which follows the northern of the two east-west routes just mentioned, it is now proposed to replace by one deep enough for large ocean vessels.[1] A ship canal with a minimum depth of seventeen feet has been constructed through the long narrow valley called Glen More or the Great Valley, which connects Loch Linnhe and Loch Ness, and divides the Highlands of Scotland into two sections. It is called the Caledonian Canal, and is noteworthy as a work of engineering, but is not much used for the purpose for which it was designed—namely, to allow sea-going ships of moderate size to avoid the stormy passage through the Pentland Firth. The short Crinan Canal allows small steamers to pass from the Clyde to the west of Argyleshire without passing round the Mull of Kintyre.

667. An oil pipe line capable of pumping 100 tons of oil per hour was opened in October 1918 between the Clyde and the Forth (Old Kilpatrick and Rosyth).

668. Surface, Ireland. The larger part of Ireland is a plain, with greater stretches of nearly level country than are to be seen in any other part of the British Isles. The hills and mountains are chiefly near the corners of the island, and being from their nature thinly peopled, and not situated so as to separate more densely inhabited areas, present no serious obstacles to communication. The flatness of the country has facilitated the construction of both canals and railways. The Shannon, the longest river in the British Isles, has been partly canalised, and has been made navigable to the head of Lough Allen,

[1] Two routes are suggested for this ship-canal, one longer, going by Loch Lomond and the Leven or Loch Long to the Clyde, but easier to construct; the other following approximately the route of the present canal, costlier to construct, but, it is contended, passing through country richer in traffic. A report presented to the Admiralty in 1917 by Sir W. G. Armstrong Whitworth and Co. expresses the opinion, however, that this would not be verified unless a sea-level canal were constructed on the shorter route.

that is, not far from its source; and it is connected by canals with Dublin by two routes, and with Belfast. The Grand Canal proceeds from Ballinasloe, on the Suck, a tributary on the right bank of the Shannon, to Dublin by way of Tullamore; the Royal Canal from a point further north by way of Longford and Mullingar; with Belfast the connection is by way of Loughs Erne and Neagh. A branch from the Grand Canal proceeds southwards to Athy, the limit of navigation on the Barrow, which enters the sea at Waterford Harbour on the south. The effect of superficial configuration on the railway communications in Ireland is to be seen rather in the lengthening of routes than in enforcing the crossing of high altitudes on important lines. The most serious deviations from the direct route are those due to the highland country on the adjoining borders of the counties of Tipperary, Waterford, and Cork, the railway from Cork to Waterford being thus compelled to run first 21 miles north (to Mallow) out of a total of 96 miles, and that to Dublin 36½ miles north (to Charleville) out of a total of 165½ miles. The most noteworthy obstruction presented by water is that due to the wide estuaries of the Suir and Barrow, but this obstruction was in a large measure overcome in 1906 by the opening of a railway bridge over the Barrow in connection with the route to the south of Ireland established by the Great Western Railway Company (England) by way of Fishguard (Pembrokeshire) and Rosslare (co. Wexford).

669. It is partly owing to the flatness of the surface in Ireland, where the natural drainage is in consequence insufficient, that the extent of bog and marsh land is so large, making up one-twelfth of the entire surface. But it must be remembered that in all parts of Europe human industry applied to drainage works and cultivation has been necessary to conquer bog and marsh, and in Ireland, as in other parts of the world in which the climate is sufficiently moist, the extent of waste due to this cause increases where agriculture is neglected. In Ireland too the extension of bog and marsh is promoted by the fact that the situation of the island causes the climate to be particularly moist (**68**). The barren mountain land, woods, and water of Ireland being also deducted, there remains three-fourths of the surface available for agriculture, including the rearing of live-stock. See also **517**.

670. Climate. The mildness and equableness of the climate of the British Isles as a whole have already been explained and illustrated under more general headings (**53, 55, 619**). The special advantages of the climate of the British Isles with regard to production are that it is favourable to active exertion throughout the day all the year round, and even for the most part stimulates to active exertion; that the mildness of the winter causes little or no interruption to field labour in any of the parts best suited to agriculture, and its comparative freedom from heavy snowfalls causes little interruption to communi-

cation; and that, for some reason or other, the climate seems to be unfavourable to the existence of insect pests which infest the crops of England elsewhere, while, nevertheless, it is seldom unfavourable either to crops or domesticated animals. For the sake of comparison with other countries it is well to remember that the average annual rainfall at Greenwich (in one of the drier parts of Great Britain) is about 25 inches, and that while the average mean temperature of the hottest month at Greenwich is 63½° F., at Edinburgh 58½°, that of the coldest month is about the same at both places, 39°.

671. The length of the shortest day (sunlight) varies from about 5½ hours in the extreme north to eight hours in the extreme south. In the more thickly-peopled region the shortest day in the year is about 6½ hours in length (in the latitude of Dundee). It is to be remembered also that the shortness of the day is to some extent compensated in the high latitudes to which the islands belong by the length of the twilight.

672. The table on p. 309 gives a conspectus of some of the main features of British **agriculture.** The first two columns are the years in which the recorded wheat area in the United Kingdom was respectively highest and lowest. The last column when compared with the others shows the influences on British agriculture of competing agriculture in other parts of the world. Under nearly all important crops, it will be noticed, there is a great diminution in area in the last year as compared with the first. Though there is an increase under mangolds the combined area under turnips and mangolds still shows a diminution. The comparison under yields is, on the whole, more satisfactory, but it is uncertain how far this is due to improved farming and how far simply to the abandonment of inferior soils and fields unfavourably situated. Wheat is the only great crop which shows at once a considerable increase in yield, and since 1895 a considerable extension of area.[1] The land no longer devoted to the crops enumerated is mainly given over to permanent pasture and forage crops (the latter, it will be observed, more particularly in Ireland), and the result is shown under the head of livestock in the large increase under the head of cattle, especially, relatively to area, in Ireland.

673. The agriculture of the United Kingdom has been greatly and probably permanently affected by the war. The direct action of the enemy enormously reduced our agricultural imports, and indirectly it tended greatly to diminish our sources of supply through the decline of emigration to new countries and the new parts of older countries, as well as the slackening or almost entire cessation of railway construction in those regions. On the other hand, this tendency was to some extent counteracted by the great stimulus to production imparted by high prices. Owing to the action of the British Government the reduction of such imports was least marked in wheat among commodi-

[1] Compare Germany, 831.

ties imported in very large amounts.[1] If the flour imported be taken as uniformly equal to 1·4 of wheat, then the total import of wheat in each of the years 1913-1920 in millions of tons was as follows :—

1913	1914	1915	1916	1917	1918	1919	1920
6·2	5·9	5·2	6·7	4·9	4·8	5·4	6·3

These figures must be taken as on the whole a remarkable testimony to the efficiency of the British sea and air defensive service. Still those for 1917 and 1918 bear speaking witness to the results of the ruthless submarine activity which began in February 1917, and explain the anxiety of the Government to make the country less dependent on imported food. This led to the attempt to stimulate the growth of grain at home by guaranteeing fixed minimum prices for the produce.[2] The rise in prices independently of the government guarantee, together with the labour shortage due to the war, had the effect of greatly increasing the demand for fertilisers and labour-saving agricultural machinery. In forming an estimate of the ultimate effect of increased efforts to increase our home supplies of grain it should not be overlooked that even the urgency of war did not bring back the wheat area of the United Kingdom to within a million acres of that occupied by that crop in 1872—3,840,000 acres.

674. Relatively to population, Ireland rears more live-stock in the aggregate than any other country in Europe, and probably than any other country in the world, except 'new countries.' In certain species of live-stock the ratio of numbers to inhabitants is greater in one or two other European countries, but not the ratio of all collectively. This ratio in the case of Ireland has, moreover, been growing on the whole pretty steadily for many years, especially in the case of cattle, horses, and poultry. The quality of the animals reared is still, to a large extent, in need of improvement, and hence the Irish cattle are mainly sent to England and Scotland as store cattle to be fattened. This is undoubtedly due in a large measure to the fact that Great Britain forms the chief market for the meat, and there is apt to be a considerable drop in values when meat is sent from Ireland to Great Britain, or fattened animals sent there to be killed ; but the great improvements that have been made in the methods of cold storage ought to afford the means of preventing, or at least greatly diminishing, the decline in value in dead meat transported from Ireland, and hence to offer encouragement for the improvement of Irish live-stock. In the average quality of Irish butter and eggs great improvements have been effected through the agency of co-operative creameries and other

[1] While the import of butter decreased from 199,000 tons in the year ending June 30, 1913, to 71,000 in 1918–19, that of cheese increased from 117,000 tons to a maximum of 144,000 in the year ending June 30, 1917.

[2] Down to 1920 inclusive the minimum prices of grain thus fixed did not reach the average import prices, and the subsequent fall in the prices of imported grain led in 1921 to the abandonment of the guarantee as a fixed policy.

ACREAGE UNDER PRINCIPAL CROPS IN THOUSAND ACRES

—	England 1869	England 1895	England 1912	England 1918	Wales 1869	Wales 1895	Wales 1912	Wales 1918	Scotland 1869	Scotland 1895	Scotland 1912	Scotland 1918	Ireland 1869	Ireland 1895	Ireland 1912	Ireland 1918	United Kingdom 1869	United Kingdom 1895	United Kingdom 1912	United Kingdom 1918
Wheat . . .	3417	1340	1822	2461	136	44	41	96	136	34	62	79	281	37	45	157	3982	1456	1971	2796[4]
Barley . . .	1864	1838	1365	1395	158	112	91	106	230	217	192	153	223	172	165	185	2483	2346	1814	1839
Oats . . .	1512	2045	1866	2415	253	242	207	366	1018	1008	957	1244	1685	1216	1046	1580	4480	4528	4075	5631
Total corn crops[1]	7785	5719	5582	6882	556	402	343	599	1417	1279	1228	1493	2208	1439	1266	1933	12,000	8865	8443	10,939
Potatoes . .	356	373	437	597	49	34	26	37	179	134	150	169	1042	701	595	702	1635	1263	1208	1518
Turnips . .	1615	1362	1016	859	67	72	57	52	490	482	440	397	322	313	272	295	2503	2238	1784	1610
Mangolds . .	287	326	473	388	5	8	12	13	1	1	3	3	21	53	82[2]	98	314	388	570	502
Total green crops[3]	2759	2467	2397	2236	127	119	104	112	689	640	615	597	1469	1152	1022	1288	5066	4400	4162	4255
Clover, sainfoin, and rotation grasses .	2005	2826	2237	1875	261	329	286	220	1183	1575	1468	1354	1670	1285	2630	2031	5150	6061	6669	5521

Yield per Acre.

—		England 1885–94	England 1903–12	England —	Wales 1885–94	Wales 1903–12	Wales —	Scotland 1885–94	Scotland 1903–12	Scotland —	Ireland 1885–94	Ireland 1903–12	Ireland —	United Kingdom 1885–94	United Kingdom 1903–12	United Kingdom —
Wheat	bushels	29·35	31·42		23·34	27·00		35·32	39·68		29·14	35·91		29·32	31·74	
Barley	,,	33·07	32·99		28·03	30·89		35·26	35·69		36·43	41·07		33·28	33·86	
Oats	,,	40·58	41·23		32·58	34·91		35·60	37·42		41·00	48·24		39·03	41·84	
Flax	stones (14 lbs.)	—	—		—	—		—	—		28·6	32·00		28·60	32·00	
Hops	cwt.	7·71	9·10		—	—		—	—		—	—		7·71	9·10	
Potatoes	tons	5·94	6·03		5·56	5·14		5·61	6·41		3·52	4·80		4·48	5·42	
Turnips	,,	12·42	13·03		14·13	15·26		14·89	16·38		13·09	16·69		13·09	14·46	
Mangold	,,	17·48	19·49		16·30	17·77		16·22	17·89		14·01	18·52		17·06	19·30	

NUMBERS OF LIVE-STOCK IN MILLIONS

—	England 1869	England 1895	England 1912	England 1918	Wales 1869	Wales 1895	Wales 1912	Wales 1918	Scotland 1869	Scotland 1895	Scotland 1912	Scotland 1918	Ireland 1869	Ireland 1895	Ireland 1912	Ireland 1918	United Kingdom 1869	United Kingdom 1895	United Kingdom 1912	United Kingdom 1918
Horses used in agriculture . .	1·1	1·2	1·1	0·7	0·1	0·2	0·1	0·09	0·2	0·2	0·2	0·1	0·5	0·6	0·6	0·4	2·0	2·1	2·0	1·4
Cows in calf or milk	—	1·8	2·1	2·3	—	0·3	0·3	0·3	—	0·4	0·4	0·4	—	1·4	1·6	1·6	—	3·9	4·4	4·6
Total cattle .	3·7	4·5	5·1	5·4	0·6	0·7	0·8	0·8	1·0	1·2	1·2	1·2	3·7	4·4	4·8	4·9	9·1	10·8	11·9	12·3
Sheep . . .	19·8	15·6	14·5	13·0	2·7	3·0	3·5	3·5	7·0	7·2	7·0	6·9	4·6	3·9	3·8	3·6	34·3	29·8	29·0	27·1
Pigs . . .	1·6	2·5	2·3	1·5	0·2	0·3	0·2	0·2	0·1	0·2	0·2	0·1	1·1	1·3	1·3	1·0	3·0	4·2	4·0	2·8

Numbers of Live-Stock per Square Mile.

—	England 1869	England 1895	England 1912	England 1918	Wales 1869	Wales 1895	Wales 1912	Wales 1918	Scotland 1869	Scotland 1895	Scotland 1912	Scotland 1918	Ireland 1869	Ireland 1895	Ireland 1912	Ireland 1918	United Kingdom 1869	United Kingdom 1895	United Kingdom 1912	United Kingdom 1918
Horses . . .	23	23	22	14	18	21	20	12	6	7	7	3	17	18	20	12	17	18	17	12
Cows in calf or milk	—	35	41	45	—	37	39	40	—	14	15	13	—	45	51	46	—	33	37	38
Total cattle .	73	88	101	106	79	95	102	107	34	40	40	40	118	138	153	150	76	90	99	101
Sheep . . .	392	307	387	256	367	404	478	469	235	243	235	227	147	124	121	110	286	249	242	223
Pigs . . .	32	49	45	29	23	35	31	27	4	5	5	3	34	42	42	31	25	35	33	23

[1] Including rye, peas, and beans. [2] Including beet. [3] Including carrots, cabbage, kohl rabi, vetches, &c.
[4] In 1919 the wheat acreage in the United Kingdom declined to 2,372,000 acres.

societies,[1] especially in the south and west of Ireland. (See also **669.**)

675. With reference to British agriculture we may note the creation of a fund known as the Development Fund under an Act passed in 1909, inasmuch as the purposes to which this fund is to be applied are mostly connected with agriculture or the utilisation of the land in some way, although fisheries are also included. The organisation of agricultural co-operation, the improvement in the means of rural transport apart from roads, which are to be dealt with by a Road Board created by the same Act, and the promotion of scientific forestry are among the tasks expressly assigned to the Commissioners entrusted with the management of the fund. There are now voluntary Agricultural Organisation Societies both for England and Scotland, and aid is given from the fund to the work of both, as well as the pioneer society in Ireland. Among the new crops in which the Development Commissioners are encouraging experiment are tobacco, especially in Ireland, where the statutory prohibition of the cultivation of that crop was removed in 1908, and sugar and beet. Though the United Kingdom withdrew from the Brussels Convention in 1913, yet the Commissioners consider that the circumstances prevent them from aiding this latter industry by anything in the nature of a bounty, but they are willing to aid it on the educational side, that is, by giving advice to the farmers as to the cultivation of the crop, and its preparation for and transport to the market.

676. The prospect of the production of beet-sugar in this country has never been so keenly discussed as it is at present. Experimentally sugar-beet has been cultivated on a small scale in various parts of England. In 1911 experiments were made at the instance of the Development Commissioners at seven stations scattered over the south, south-east, and midlands of England, and as the result of those experiments the Commissioners regarded it as proved that beet giving yields equalling if not exceeding those obtained on the Continent could be grown in England, though they added that they did not propose to answer the question whether farmers could profitably substitute beet for another root crop.[2] Commercial experiment is left to private enterprise, and this resulted in 1912 in the establishment of a sugar factory at Cantley, near Norwich, for the treatment of sugar beets grown in the neighbourhood. The success of these efforts would be important in several ways indirectly. As pointed out in par. **428**, the sugar-beet industry is advantageous to that of cattle-rearing.[3] Fur-

[1] The establishment of these societies was due to the efforts of Mr. (now Sir) Horace Plunkett, afterwards Vice-pres. of the Dept. of Agriculture and Technical Instruction, Ireland, established in 1900. With much difficulty he succeeded in getting the first established in 1889. The number is now considerably more than a thousand.

[2] Report [Cd. 6162] of 1912, p. 14.

[3] As to other agricultural advantages ascribed to the growing of this crop see J. W. Robertson, *Sugar Beet*, London, 1911, more particularly pp. 220–4.

ther, it is an industry essentially attached to country districts as opposed to large towns. This is an almost inevitable consequence of the facts already mentioned. Where considerably more than 80 per cent. of the raw material is a waste-product so far as sugar-manufacture is concerned, and this waste as a by-product finds its market in the same districts as that in which the raw material is grown, the advantage of having the sugar-factories close to the beet-fields is obvious. In Germany, according to the industrial census of June 1907, 33·6 per cent. of the people employed in sugar-factories lived in communes of less than 2,000 inhabitants. Now the factory industry is essentially a seasonal one, being carried on only for three or four months during the winter—after the beets are reaped. It accordingly is one that will provide employment in country districts at a period when agricultural employment is slack, and will at the same time be an aid in maintaining the labour supply for those districts all the year round.

677. The establishment in 1900 of the Department of Agriculture and Technical Instruction for Ireland has resulted in the obtaining of information throwing interesting light on an important branch of the internal trade of the United Kingdom. A report annually issued by that body gives information as to the trade of Ireland as distinct from the rest of the United Kingdom, and some of the data in those reports are reproduced in the statistical appendix. With regard to these figures, however, it should be mentioned that we are informed that the Department has not at its disposal, in many cases, such satisfactory documents of information as those made use of in compiling the Annual Statements of the Trade of the United Kingdom, so that 'it cannot be too plainly stated that as furnishing an index of the external trade of Ireland the present system is inadequate,' but, on the other hand, it is contended, no doubt quite justly, that these returns furnish 'much information sufficiently approximate to be of great value.' It should be remembered that what is set forth in those figures is the whole external trade of Ireland, that is, the trade which Ireland carries on directly with foreign countries and the British colonies and dependencies, for which the department has at its disposal the information collected by the Customs officers of the United Kingdom, and the trade which Ireland carries on with Great Britain, made up partly of the import into Ireland of articles of British origin and export from Ireland of articles of Irish or other origin which are consumed in Great Britain, and partly of imports of foreign and colonial origin and exports to foreign countries and the colonies through Great Britain. This latter trade is very large in both directions, but there is in most cases no means of distinguishing it from the trade special to Great Britain and Ireland in their mutual relations. (See par. **763.**)

678. Still, bearing this in mind, one can in many cases infer from the nature of the commodities something as to their origin or destina-

tion or both. Thus, in the case of cattle and other live-stock, butter, and eggs, poultry, potatoes, and bacon and hams exported we are pretty safe in assuming that these are practically all of Irish origin and all find their final market in Great Britain ; and it hence becomes interesting to have the means, as we now have (at least approximately), of comparing the total Irish exports under these heads with the total imports of the same commodities into the United Kingdom. This does not give us an exact measure of the share which Ireland has in supplying Great Britain with those commodities, inasmuch as the respective imports include those into Ireland (whether direct or indirect), and in the case of bacon the import is very considerable. The Irish share in supplying Great Britain is thus understated in proportion to the amount of the Irish import relatively to the total import.[1]

679. Looking at the imports into Ireland, we have no difficulty in identifying the imported coal as all of British origin, but in other cases we are wholly at a loss. Even the cotton manufactures imported into Ireland from Great Britain must include a considerable proportion of foreign origin.

680. Making as careful an estimate as the existing information permitted, the department found the total value of imported goods re-exported from Ireland without change in 1908 was about £2·9 millions sterling, or about 5 per cent. of the total value of the exports. In every year the largest re-export is raw cotton shipped from Belfast,[2] a trade which throws interesting light on *entrepôt* trade generally. The raw cotton comes to Belfast from the southern states of the Union in ships laden with grain, timber, and timber products required in and round Belfast, and is afterwards despatched to Russia in ships that bring back flax.

681. The important trade in butter was the subject of inquiry by a commission which was appointed in 1909 by the Department of Agriculture and Technical Instruction and reported in 1910.[3] The results of the inquiry made the influence of geographical circumstances on the trade in some cases very conspicuous. As might have been expected the bulk of the Irish butter sent to Great Britain is consumed

[1] These things being kept in mind it is worth noting that in 1908 the value of the live-stock exported by Ireland was twice as large as the total import into the United Kingdom ; that the value (though not the quantity) of Irish eggs exported was greater than that imported by the United Kingdom from any single country, Russia coming next ; that the value of Irish butter exported was much less than half that imported into the United Kingdom from Denmark (about £4,000,000 against nearly £11,000,000, Russia, that is, chiefly Finland and Siberia, coming third with £3,400,000) ; that the value of the poultry exported from Ireland was much greater than that imported by the United Kingdom from any single country ; that Irish exports of potatoes as compared with the imports into the United Kingdom from France and the Channel Islands rank second in point of quantity, but only third in point of value ; and that in a similar comparison in respect of bacon and hams Ireland comes only fourth in value, being surpassed under this head by the United States, Denmark, and Canada.

[2] Value in 1908, £1,174,000.

[3] Cd. 5092 of that year.

on the west side of the island, whereas the principal markets of the Danish and other continental markets are on the east side. When one considers that London lies on the east side, and what that implies as to the numbers of the population for which the retail trade can be supplied directly from the river side without further break of bulk, one will see what an enormous advantage this must be ; and when one thinks of the large additional population most easily accessible from the Humber, the Tyne, the Forth, &c., it will not seem surprising that Denmark and the Baltic should secure a large, even a predominant, portion of this trade. Still, the Commissioners are of opinion that Ireland has advantages which it does not fully utilise. They think that Ireland has the best soil and climate in the world for all kinds of dairy produce, and find that in all the large centres of population in Great Britain the best of Irish creamery butter is considered to be the best butter in the world. But of this butter the quantity is very small, and the bulk of Irish creamery proprietors have not yet attained that degree of proficiency which might be looked for. Further, Ireland sends over large quantities of non-creamery butter, which is not the case with any other country supplying the wholesale markets of Great Britain, and though some of this butter is of the best, the bulk tends to bring down the average quality. In addition to that Danish butter reaches Great Britain in nearly equal quantities all the year round, whereas the Irish trade is almost confined to the six summer months, a fact which has in various ways a prejudicial effect on the Irish trade. For that reason the Commissioners strongly urge the practice of winter dairying in Ireland, even though that involves the necessity of the process known as pasteurisation, which, the Commissioners think, would not deprive Irish butter of its superiority of flavour, although it is admitted that that is one of the causes of the insipidity of Danish as compared with the best Irish butter consigned fresh from Ireland.

682. Looked at as a whole the trade of Ireland presents two noteworthy features. First, unlike that of the United Kingdom, it shows a nearly even balance of imports and exports. Second, the value per head is exceptionally high. The report cited has a table comparing Irish trade in this respect with that of many other countries, and that table shows that even on the side of imports the value per head in Ireland is considerably higher than in the United Kingdom, on the export side much higher—a natural result of the predominantly one-sided character of Irish industry.

683. Commerce. The tables in the Appendix show that till the war the foreign commerce of the British Isles was much greater in value than that of any other country in the world,[1] and greater also per head than that of most other countries in which there is a population of great density. This shows that for foreign commerce this

[1] The export trade is behind that of the United States since 1900 absolutely but not per head.

country must have peculiar advantages of one kind or another, and we must therefore consider what these advantages are. First of all it will be well merely to enumerate these advantages, as well as the disadvantages under which this country labours, and afterwards to examine more particularly the nature of those which require elucidation. It should be noted, however, that in this enumeration the sole point of view is the immediate interest of commerce. It is not intended to hint that all the so-called advantages and disadvantages are necessarily to be regarded as such with reference to the well-being of the people.

684. The advantages are **(1)** a favourable climate; **(2)** the abundance of coal and iron and some other raw materials, especially raw materials leaving much waste **(205)**; **(3)** the efficiency of British labour; **(4)** the fact that nearly all the great mechanical inventions by which modern industry has been revolutionised originated in this country, which thus got the start of other countries in their application; **(5)** the abundance of capital; **(6)** the concentration of population in our industrial regions, facilitating the organisation of industry, including the minutest subdivision of labour; **(7)** the completeness of the internal communications; **(8)** the nearness of the coast on both sides; **(9)** the abundance of seaports; **(10)** the geographical position; **(11)** the magnitude of the shipping; **(12)** the extent of the British colonial and other possessions **(693)**; **(13)** the extent to which the English language is spread over the globe; **(14)** the long establishment of our commercial relations with the best markets of the world; **(15)** the free trade policy that prevailed in this country for more than a generation.

685. The disadvantages that have to be placed on the other side are **(1)** the dearness of land arising from the density of population and the great development of industry, a disadvantage necessarily most experienced in the great centres of industry; **(2)** the deficiency of large water-powers, now essential in some branches of industry **(116)**; **(3)** the higher rate of wages paid in Great Britain compared with those paid by its chief rivals in manufacturing industry; **(4)** the government restrictions on labour; **(5)** the backward state of education, and especially of technical and commercial education, in the United Kingdom compared with the point reached in this respect by some of its rivals; **(6)** the irrational spelling of the English language; **(7)** the want of a decimal coinage and system of weights and measures; **(8)** the high tariffs of many countries of the world.

686. It scarcely needs to be pointed out that the advantages and disadvantages above enumerated are not mentioned in the order of their importance. Of the advantages those from 1–6 are such as affect the production of articles of commerce, and the remainder, those which pertain to their distribution; and of the former Nos. 1 and 2 may be reckoned as natural advantages, Nos. 4, 5, and 6 advantages mainly due to historical causes **(17 and 18)**. No. 3, the efficiency of the

British artisan,[1] is partly to be looked on as a natural advantage arising from the climate, partly an historical advantage, due to the acquired skill resulting from the experience of generations and from familiarity with a gradual and constant series of improvements in industrial operations. (See **373,** and comp. **137** and **524.**)

687. With regard to the advantage of the climate it is unnecessary to say more; but in relation to the second of the advantages enumerated above, wealth in coal and iron, besides referring the reader to pars. **512-518** and **538-539,** it is necessary to point out that the advantage we possess arises not only from their abundance, but also from the fact that important supplies of both are found quite close to seaports, and that the coal necessary to the smelting of the iron is at no great distance from the iron ores, in some cases on the very spot. It should also be noted that the recent technical advances in the utilisation of coal, especially in connection with the iron industry, redound further to the advantage of Great Britain. 'Probably,' says Mr. Bone in his *Coal and Its Scientific Uses* (p. 437), 'no other European country is better adapted than our own for such co-operative schemes [for using electric energy developed at large centres, *e.g.* the formation of electricity districts under the Electricity Act of 1919], because of the compactness of our great industrial areas, the density of their populations, and their proximities to the coalfields.' On these points the map on page 317 may for the most part be left to speak for itself; but it may be pointed out that the great coalfield of Durham and Northumberland is bisected by the estuary of the Tyne, to which belong the seaports which first carried on a great trade in coal, and is in immediate proximity to Sunderland and various minor ports, and that its southern end is close beside the iron deposits of Cleveland in the North Riding; that the coalfield of Cumberland includes the seaports of Maryport and Whitehaven, besides Workington, and lies close to the rich iron ores [2] of south Cumberland and north Lancashire; that the South Wales coalfield has given rise to a vast iron industry through the fact of its having possessed great beds of ironstone, though these are now worked only to a limited extent, in consequence of the facility with which less refractory ores can be imported from abroad; and that in Scotland the coalfields are likewise close to the sea, and likewise rich in iron. In the west of Scotland the Ayrshire coalfield extends to the ports of Troon and Ardrossan; in the Clyde basin the coalfield extends below the port of Glasgow, and the ports of Grangemouth, Alloa, Burntisland, Dysart, Leith and others are either upon or quite near coalfields further east. The western coalfield supplies large quantities of splint coal, which can be used directly in the smelting of iron ores. The blackband ironstone once plentiful in parts of these coalfields (as in Ayrshire and the Clyde basin), yielded a very fine quality of wrought iron, which before the cheapening of steel had come to be the principal

[1] See note to par. **697.**

[2] See, however, par. **740.**

ship-building material. This ironstone also is for the most part so rich in carbonaceous matter as to reduce considerably the expense for fuel in the operations preliminary to smelting (**529**). Limestone and ganister, two other minerals of great importance in the iron industry (**529, 532, 535**), are also abundant in Great Britain, and in some cases on or near the beds of iron ore. Of the two chief centres of production of iron ore in England the eastern or Cleveland district produces by far the greatest quantity, but the value is not proportionally great, because the ore is comparatively poor in iron and contains a high proportion of phosphorus. At present it is worked only near the outcrop, where it contains from about 35 to 40 per cent. of iron. The western deposit in Cumberland and the Furness district of Lancashire is a red hematite (**529, 534**), richer in iron, and containing very little phosphorus, and forming the only true Bessemer ores obtained in this country. Outside of the area shown in the map a coalfield in Kent, near Dover, with deposits of ironstone, has recently been developed, and deposits of iron ore have come to be worked on the island of Raasay, east of Skye. On the same island oil shales have more recently been discovered. As to the more important oil-shale districts of Scotland see par. **555.** In England, where several oil wells have been drilled, one at Hardstoft in Derbyshire has a natural flow of 50 barrels a week.

688. Recent borings have extended the area of proved workable coal in the eastern midlands considerably, and some geologists believe that the last Royal Commission on Coal Supply has not extended sufficiently in that direction the area of overlaid coal. Mines have been sunk in the neighbourhood of Doncaster, and the middle of Nottinghamshire, and workable seams have even been found to exist at Scunthorpe in Lincolnshire, where, as the map shows, there are important deposits of iron ore. In the western midlands also coal is now worked in at least one district not previously tried. A mine has been opened at Binley, just outside (south-east) of Coventry, in Worcestershire, this mine being the nearest to London of all as yet in operation—about ninety-five miles from Euston Station. The Kent and Sussex mines in the extreme south-east of the country will be even nearer, and there appears to be a prospect of those being worked with commercial success. Other mines have recently been opened near Warksworth and at Plenmellor in Northumberland, near Wirksworth (Derbyshire), and at Blidworth, Clipstone, Ollerton, Bilsthorpe, &c., in the Dukeries.[1]

689. It will be observed from the map that the production of iron ore on the coalfields of Great Britain is comparatively small, but the report on *The Iron Resources of the World* includes among the potential iron reserves of this country enormous deposits of clay ironstones

[1] The Mansfield Colliery in this district is at present probably the most productive in the country. In 1920 the output amounted to 312 tons per head, the daily output to 1·65 tons per shift.

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belonging to the British coalfields. In England these lie chiefly in the Yorkshire, Derbyshire, and Nottinghamshire field, in those of North and South Staffordshire, and the Severn coalfields ; and in Wales both in the northern field and along the northern margin of the South Wales field. The total potential reserve is estimated for England and Wales at 7,100, for Scotland at 2,400 million tons of metallic iron, the highest under this head in any country in the world.

690. In respect of mineral resources Ireland is much less fortunate than Great Britain. The most productive coal-mines of Ireland are at a considerable distance from the coast, in the north of the county of Kilkenny, and at a great distance from the only iron-producing district in Ireland, in the county of Antrim. The Irish coal, moreover, is of inferior quality, and the total production of coal and iron in Ireland is not equal to one per cent. of the total production of these minerals in Great Britain. Considerable supplies of iron ore (aluminous hematite) are obtained near Glenarm, co. Antrim. Fine granites and marbles are said to give promise of extensive development in Ireland.

691. The fourth, fifth, sixth, and seventh of the advantages enumerated in par. **684** require no special elucidation, though it may be pointed out that (**5**) and (**6**), the abundance of capital, and the advanced organisation of industry, are in part a consequence of (**4**), that is, of the United Kingdom having got the start of other countries in modern mechanical appliances ; but this again is subject to a qualification pointed out in par. **712**. With regard to the eighth of our advantages, the nearness of the coast on both sides, it is hardly necessary to explain how this may place a manufacturing region within easy reach of many more markets than are accessible to one that has outlets only in one direction. The precise nature of this advantage is well illustrated by the trade of some of our seaports. Though Lancashire, on the west side of the Pennine Chain, is the great seat of our cotton manufactures, Hull exported in 1885 nearly as great a value of cotton yarn as Liverpool, Hull and Grimsby together much more than Liverpool ; the eastern ports of Great Britain collectively always export more of that yarn than the western ports. The reason of this is that continental nations (Germany, France, &c.) are among our chief customers for cotton yarn, and these are most easily reached from the east side. The woollen manufactures, again, are mainly carried on to the east of the Pennine Chain, but the woven fabrics are much more largely exported from Liverpool than from any other port, though woollen yarns are exported thence only to a limited extent. The abundance of seaports, the ninth of the advantages enumerated above, is what enables the advantage just illustrated to be utilised ; but it is obvious that it is an advantage also in another way, in the extent of the accommodation it provides for shipping. No doubt such accommodation can sometimes be provided artificially, as in most cases it

needs to be improved artificially, but there is an enormous advantage in respect of cost where facilities are furnished by nature at a great many different points. In the British Isles there are more than twenty seaports with a depth of at least twenty-five feet at high water, and most of these are situated in the vicinity of the great seats of production. In view of the increasing size of the shipping of the present day (**166**) this large number of deep harbours is a matter of peculiar importance to the commerce of this country.

692. The tenth of the advantages named in par. **684**, the geographical position of the British Isles, is of great moment in more ways than one. In the first place the ‘ silver streak ’ is a natural bulwark of the highest value. It enables the kingdom to place its chief reliance for defence upon the navy, which makes a much less heavy drain upon the working population than the vast armies which continental nations are obliged to train and keep on foot. Secondly, it is of great importance to British commerce that our islands occupy a somewhat central position among the nations that carry on a great commerce at the present day. It was of no importance to us that America lay on our west, until America began to rear a population more or less dependent on foreign commerce. In view of the three advantages specially considered in the last two paragraphs it may be safely asserted that this country has in the aggregate greater advantages than any other area of equal extent for reaching all those parts of the world which are most conveniently reached from the seaboard. The effects of this with respect to the distribution of our own products will be understood readily enough from the illustration already given of the advantage of having seaports on different sides ; and its influence on our trade in foreign goods is considered below in par. **710.**

693. The advantages accruing to British commerce from the extent of the British empire are in a large measure indirect. The fact that throughout the empire the English language is the language of commerce is important, and the fact that British officials throughout the empire are likely to be more or less in touch with British traders is no less so. Since the adoption by the United Kingdom of a free trade policy it is only recently that direct efforts have been made to promote trade between different parts of the empire. Since 1887 several colonial or, as they have been called since 1907, imperial conferences have been held, in which among other matters the interests of trade have been discussed. The self-governing colonies now give preference in one form or other to imports from the mother country and in some cases from other parts of the empire. In this policy Canada was the pioneer in 1898. South Africa and New Zealand followed in 1903, and Australia in 1908. At the colonial and imperial conferences the representatives of the self-governing colonies have more than once urged upon the mother-country the granting of a preferential tariff to the members of the empire. So far this has not been conceded, but the policy of

non-interference with inter-imperial trade has been so far abandoned that in 1912 a Royal Commission on the Natural Resources, Trade and Legislation of Certain Portions of His Majesty's Dominions was appointed.[1]

694. Inasmuch as fiscal policy undoubtedly affects the commercial value of local resources and place relations, it cannot be said that the discussion of the suggested preferential tariffs between this country and the colonies would be altogether out of place in this work; but the omission of such a discussion will no doubt be excused in view of the vastness of the subject and of the fact that the relevant considerations are more economic than geographical. There is here given,

United Kingdom—Exports of British and Irish Produce and Manufactures, exclusive of ships and their machinery. Percentages of total values in—

To	1871–75	1876–80	1881–85	1886–90	1891–95	1896–1900	1901–5	1906–10	1911–13
All British possessions	26·84	33·5	35·0	34·4	33·1	34·4	37·8	33·7	36·4
All British possessions, except Hong-Kong	25·5	31·9	33·6	33·31	32·2	33·5	36·7	32·9	35·7
All British possessions, except Hong-Kong and South Africa	23·9	29·3	31·3	30·6	28·4	28·4	29·8	29·4	31·5
All foreign countries	73·2	66·5	65·0	65·6	66·9	65·6	62·2	66·3	63·6
France, Belgium, Holland, Germany, Sweden, and Norway	28·8	26·2	24·0	21·9	23·6	25·6	22·5	22·7	22·8
France, Germany, Italy, Russia, and United States	37·6	32·8	31·7	30·9	30·7	29·5	26·9	27·7	25·8

however, a table, from figures already for the most part to be found elsewhere in this work, designed to exhibit in a compact form data bearing upon this discussion or of interest in connection with it. Since the growth in the British export trade to British possessions down to the period in which its proportion of the whole export reached a maximum (1901–5), mainly due to the increase in the trade with Hong-Kong (which is not really colonial trade at all, but trade with China and other Eastern countries) and South Africa, the table contains lines showing the variations in that trade apart from these possessions. The fifth line shows the total export trade with our nearest neighbours, and the last with a group of countries with the most highly protective tariffs.

695. With regard to language, in order to realise the importance of this factor one has only to think of the rapid increase of an English-speaking population, not only in the more important British colonies, but also in the United States. As to the free trade policy of this country, reference must be made to pars. **26** and **27,** and it should be added that since 1908 the most rigorous interpretation of a free trade policy has been so far given up in this country that foreigners holding

[1] The tendency to grant a preferential tariff to the mother country has been greatly increased since the war.

patent rights in the United Kingdom are required to produce the patented articles in this country. The passing of the Safeguarding of Industries Act, designed to protect certain 'key industries' (27), is a still more marked departure from our former free trade policy.

696. Of the economic disadvantages of this country mentioned in par. **685** the deficiency of water-power is, in view of the great wealth in conveniently situated coal, a disadvantage chiefly in relation to those industries which demand very high powers. Still it must be kept in mind that all economies in the applications of water-power must tell more in favour of some other countries than our own, and such economies must become relatively more important through any causes that tend to raise the price of British coal. According to evidence given by Professor Forbes to the last Royal Commission on Coal Supplies, there are even in Scotland few places capable of developing more than 1,000 horse-power, and the total possible annual saving of coal by the use of water-power in the United Kingdom is estimated at only 1,200,000 tons.[1]

697. The next disadvantage mentioned, the dearness of land, may be regarded as a necessary result of the development of our industries. The third, the higher rate of wages, if considered by itself, cannot but be looked upon as a disadvantage in the struggle for cheapness into which the competition for foreign commerce in a large measure resolves itself; but it must not be forgotten that in considering the cost of labour the relative efficiency of labour has always to be taken into account, and it is contended by many who have had adequate opportunities of ascertaining the facts that, as compared with the continental workman, 'the English workman, notwithstanding his shorter hours and higher wages, is to be preferred.'[2]

698. The backward state of education, and especially of technical and commercial education, in this country was a few years ago a more

[1] Final Report of Commission, p. 16. For a more sanguine estimate of the possibilities of water-power in Scotland, see a paper by Alex. Newlands on 'Our Sources of Power with Special Reference to Highland Water Power' in the *Transactions of the Inverness Field Club*, 1912. See also second interim report of the Water Power Resources Committee of the Board of Trade (Cmd. 776). A water-power scheme which dwarfs the greatest of the world's installations has been prepared (1920) by the Ministry of Transport. It is proposed to construct a concrete barrage, serving as a bridge for railway and motor traffic, across the Severn estuary near the Tunnel, where the channel is 2½ miles wide. By means of a series of sluices and turbines the tides will be harnessed to develop over 500,000 horse-power during a ten hours' day, with a peak-load capacity of over a million horse-power at a cost of just over ½*d.* per unit. Above the barrage a deep-water basin of over 27 square miles would be utilisable by the largest vessels at all states of the tide. The estimated cost is £30,000,000. Such an installation would, it is claimed, supply the industries of the Midlands and South Wales with a permanent supply of cheap electric power, and set free annually 4,000,000 tons of coal used for generating power (514).

[2] It is extremely difficult to discover how far this is still true. In any case such general propositions must be understood in a very guarded manner: as being at the best, if true on the whole, subject to exceptions which it is impossible to set forth in detail.

serious disadvantage than it is now (**36, 37**), but constant efforts in this direction are needed to bring or keep us abreast of our rivals. In relation to this, it is, however, important to point out that one of the most serious hindrances to advancement in education is the fact that the English language is burdened with a mode of spelling in favour of which not one argument of weight can be advanced except the fact that it exists and is difficult to get rid of. 'English spelling,' says Max Müller, 'is a national misfortune, and in the keen international race between all the countries of Europe, it handicaps the English child to a degree that seems incredible till we look at statistics.'[1] As a hindrance to the acquisition of the English language by foreigners, and more particularly to its spread among people to whom it would be an advantage to make the language their own, as among the non-English-speaking inhabitants of the United States and Canada, it is a check on the extension of British commerce in another way.

699. The want of a decimal coinage and system of weights and measures is beginning to be felt more and more among the mercantile class as an evil, not only on account of the needless difficulties thus thrown in the way of education, but also as an impediment in ordinary business transactions.

700. But of all obstacles to the extension of our commerce, the greatest perhaps consists in the high tariffs of many foreign countries, and it is of course none the less so because these high tariffs act in the same degree, or even a greater, as a restriction on the development of the commerce of the countries maintaining them.

701. So much with regard to the advantages and disadvantages of this country in relation to foreign commerce; but we must bear in mind that the greatest possible advantages are exhaustible, and, however vast the commerce of a country may be, it is necessary to that country's prosperity, in so far as it depends on foreign commerce, that that commerce should go on increasing, and the increase at least keep pace with the growth of the population. Enormous as the advantages of the British Isles may be, if British commerce has been pushed too far on the strength of merely temporary advantages, other nations will be apt to gain at British expense. There will be a difficulty in maintaining the distance ahead to which British commerce has reached. To assist in attaining this end so far as possible, a government Department of Overseas Trade, with correspondents of various rank in different parts of the world, was set up in July 1917.

702. It will now be worth while to examine in the light of the foregoing considerations the statistical tables in the Appendix setting forth the main features of British trade since 1871. First we note the high place which bulky articles take both in our import and export trade,

[1] *Contemporary Review*, November 1879, p. 381. This has been questioned, but the more I consider the matter the more am I satisfied that it can be questioned only by those who do not know the facts or will not give their mind to them.

among the imports timber, grain, ores, among the exports above all coal. To appreciate the importance of this fact, however, one must compare the table showing the total values of the commodities mentioned in the tables with the values per ton given in another table. That will enable one to understand how, for example, iron ores with their average value of less than £1 per ton, though the last of the commodities enumerated in order of value in the table of imports, must take a quite different place in an enumeration of British imports according to quantity.[1] Still bulkier in proportion to value is coal, which in respect of quantity is by far the most important of British exports.

703. This export trade in coal is one of peculiar importance to Great Britain. Professor Jevons was, so far as I am aware, the first to point out what a large amount of our shipping is employed in the carriage outwards of this one commodity, and the fact was afterwards repeatedly emphasised by Sir Rawson Rawson, who made calculations on this head based on the assumption that four register tons of shipping would be required to convey nine tons weight of coal. In 1898 coal was estimated to make up 86 per cent. of the total weight of British exports.[2] Professor Jevons also pointed out the indirect importance of this traffic to the commerce of the United Kingdom, through the fact that the ships that go out laden with coal are ready to bring back cargoes of foreign goods at low freights. Professor Marshall thinks that he somewhat exaggerated the importance of this feature of British trade, inasmuch as many of our colliers return regularly in water ballast. In short voyages that is true, but there can be little doubt that the export of coal to Argentina and California must contribute to the cheapness of homeward freights from those distant parts of the world, or reversely that it would not be possible to export coal to the Pacific seaboard of the United States, as we do, if it were not for the homeward freights of wheat.[3] It should also be noted that a large part of the coal exported by this country is for the use of steamers

[1] See an attempt at such an enumeration by the author of this work on p. 119 of the *Scot. Geog. Mag.* for 1908, in a paper on ' Economic Geography.'

[2] See p. 449 of the paper by the late Lord Rhondda, then Mr. D. A. Thomas, M.A., M.P., in the *Jour. Roy. Statis. Soc.*, vol. lxvi., on the ' Growth and Direction of our Foreign Trade in Coal during the last Half Century.'

[3] This coal trade is regarded by some with little satisfaction. It is considered by them that it would be better to retain for ourselves the raw material on which the manufacturing industry of the country so largely depends. To me, however, it seems that this view can be held only by those who look at but one-half of the facts. They look forward to a time when our coal will be used up or become too scarce and dear to be economically useful; but the policy they advocate would only postpone that date—would not prevent it from arriving. Moreover, if it were practicable to retain all our own coal for our own use, it would lead to the further stimulation of manufactures and population within Great Britain, so that when the time apprehended arrived there would be a larger population to provide for in some other way. The policy of unrestricted trade in coal tends to distribute the population created by it over a wider area, and on that account this trade seems to me one of the healthiest parts of the trade of the United Kingdom.

coaling abroad, the greater proportion being British steamers (see Mr. Thomas's paper, p. 469).

704. When we reflect that all our external trade as well as much of our internal trade is necessarily carried on by sea, and that that trade involves such an enormous quantity of bulky cargoes both outwards and inwards, it is obvious that we have here one important cause that must tend to promote British shipping, the magnitude of which has already been referred to. When we consider also our local advantages for the building of steel ships and their engines, and the large proportion of our maritime population, the great preponderance of British shipping is not surprising, nor even the fact that it should have attained such dimensions that the crews are made up in increasing proportions of foreigners.

705. Another striking feature of British trade is the large and increasing excess of the value of the imports over the exports.[1] The explanation of this is found in what have come to be known as invisible exports, that is, economic services rendered by the people of this country to other countries for which those who render such services are entitled to be paid. The most important of these are loans to foreign countries and British possessions and the earnings of British shipping on foreign or colonial account. Much uncertainty is indeed introduced into these estimates by the fact that registration of shipping under a certain flag does not prove that the shipping is all owned by subjects of the nation to which that flag belongs, and that loans to countries abroad issued in the United Kingdom are not all held by residents in this country, but may and often do include large sums lent by foreigners. Much shipping under foreign flags is owned by British subjects, but, on the other hand, much foreign capital is invested in British ships. This fact was made manifest in a striking manner by the formation in 1902 of the International Mercantile Marine Company. This company was incorporated at Trenton, New Jersey, and acquired the control of most of the chief British Atlantic steamship lines,[2] whose ships, however, are still to retain British registration, although the British holding in the company amounts to only £13,000,000 against an American holding of £21,000,000.[3] Large sums

[1] Amounting on the average of the five years 1906 to 1910 to £142,000,000.

[2] The British lines transferred to the company were the White Star, Dominion, American and Leyland lines. The principal British company trading with the United States remaining outside the International Company is the Cunard Company, with which about the same time the British Government made an agreement that, on condition of its remaining a purely British undertaking for twenty years, holding for that term all its vessels at the disposal of the British Government on agreed terms, agreeing 'not to unduly raise freights' or give preferential rates to foreigners, and undertaking to 'build two large steamers for the Atlantic trade of high speed,' the British Government would lend the money to build the ships, and from the time when the ships began to run would pay to the company an annual subvention of £150,000.

[3] In explanation of the formation of this company it should be mentioned that at all the ports of the United States except New York, where the water frontage of

are also earned in this country by banking and insurance business transacted on account of residents and abroad, and by the management of businesses whose earnings are derived from abroad, an item which must be distinguished from the mere return on foreign investments, for all office expenses on businesses must be deducted before dividends are declared. Difficult as it is to form precise estimates under all these heads, the aggregate earnings thus indicated are undoubtedly very great.[1]

706. When we look at the items of which our imports are made up we cannot but be struck at the very high proportion of food-stuffs. Among these wheat has only in the last two periods begun to rise again in percentage value, and flour has even been diminishing in absolute value owing to the diminishing proportion of the total wheat supply from North America. On the other hand, meat, butter and eggs, fruits and nuts have all been increasing steadily or nearly steadily in the proportion which they have to the whole value of our imports. Three other items show a like rapid rise in relative importance—rubber, cotton manufactures, and iron and steel manufactures. The cause of the rapid rise in the import of rubber is known to every one. The increase in the import of cotton manufactures is striking, and it seems all the more striking when we find that the average value of the imports of cotton piece goods per yard is much higher than that of the exports. The explanation is found in the fact that the imports are mainly printed or dyed goods—chiefly from Germany, followed by France and Belgium. The iron and steel imports are mainly of half-manufactured articles of which there is little or no waste in further manufacture, forming the raw material of higher branches of industry (**205**).

707. As to the origins of the imports the attention of the reader is drawn to the note on the table showing those origins; but we may note here that the most striking relative advance is shown by the Argentine Republic and that from 1886–90 the group Germany,

Manhattan Island or the original city of New York belongs to the public authority, all the wharves are the terminal stations of the railway companies, which thus in a large measure control the ocean freights, and the American holders in the International Mercantile Marine Company have a controlling interest also in those railway companies. Unity of management will thus be given to the whole business of transporting American produce from the place of origin to the chief European markets.

[1] In 1914 Sir George Paish stated that 'his own calculation was that we had now to receive something like £340,000,000 or £350,000,000 from abroad. That was made up as to rather over £200,000,000 of interest, as to over £100,000,000 from shipping, and as to the balance of about £30,000,000 or £40,000,000 from income tax derived by insurance, commission earned by bankers, stockbrokers, commission agents, brokerage firms in Mincing Lane and so on.' *Jour. Roy. Stat. Soc.*, vol. lxxvii. (1914), p. 810. See also 'The Excess of Imports,' by Sir Robert Giffen in the *Jour. Roy. Stat. Soc.*, vol. lxii. (1899), p. 1, and 'Great Britain's Capital Investments,' by Mr. (afterwards Sir) George Paish, in the same periodical, vol. lxxiv. (1910–11), p. 167. A striking illustration of the effects of the war is offered by an estimate in the *Board of Trade Jour.*, No. 1202, p. 117, which puts the net national income from shipping in 1920 at £340,000,000 sterling against one of £94,000,000 in 1913.

Netherlands, and Belgium was stationary in relative importance. The great fall in the case of China and Hong-Kong is easily accounted for by the changes in the tea trade, and that of the West Indies and British Guiana by those in the sugar trade.

708. No less striking than the high place taken by food-stuffs among British imports is the uniform and remarkable preponderance of cotton manufactures among the exports, even although their relative importance has long been diminishing. It has already been pointed out (**377**) that this preponderance is at least in large part due to the great commercial advantages of Great Britain, the special facilities that this country has for reaching all those parts of the world most easily reached from the seaboard, combined with the fact that cottons are in universal demand and this country has a world-wide trade in bulkier articles. And in connection with this it should be added that this country makes use of all its great ports in disseminating its cottons. In any one year the proportion of the value of cotton manufactures and yarns exported from the two ports of Liverpool and Manchester is only about two-thirds of the whole, leaving one-third to be exported by London, Southampton, the Humber ports, Glasgow, Harwich, and others. No ship ever leaves Liverpool entirely laden with cotton goods. A cargo of 500 tons of such goods is considered a very good lading for a ship with a total cargo of 3,000 tons. The very magnitude of the trade promotes it still further through being favourable to a high degree of organisation, which is further favoured by the remarkable concentration of the industry (**723**). This too is an industry in which the cheapness of capital and the advanced state of the machine industries of this country are also peculiarly important. It is on these accounts that a cotton-spinning mill can be erected more cheaply in Lancashire than in any other part of the world.[1] The export of iron and steel manufactures is also a remarkable illustration of the commercial advantages of this country, especially when we consider the relative advance of other countries (**539**) in the conditions favouring the initial stages of the industry, and the remarkable recovery since the period 1891–95. In 1886–90 the United States took about three-fourths of the value of the tinned plates exported from this country, one of the most important articles under this head. Now the import of tinned plates in that country is comparatively small, but the loss under this and other heads has been more than made good in widely scattered markets. It may be pointed out that iron and steel manufactures are among those comparatively bulky commodities that help to cheapen the carriage of more valuable ones. (See the table of prices of British exports, &c., in the Appendix.) Of the other features of the export trade of the country the steady or almost steady increase even

[1] So it is stated by Sir Charles Macara, the President of the Confederation of Master Cotton Spinners and Manufacturers Associations, *Econ. Jour.*, vol. xxii. (1912), p. 643.

in the relative value of the exports of coal and machinery is very noteworthy. On the coal export enough has been said already (**703**). Machinery is a growing export in all highly advanced manufacturing countries.

709. As to destinations we may note that the maximum percentage to India was in 1886–90, but there has been a rise since 1896–1900. There was a marked fall to the Germany, Belgium, Netherlands group between 1871–5 and 1881–5, but since then the percentage has been fluctuating. Higher percentages for recent periods or some recent periods may be noted in the case of South Africa, Italy, Egypt, Sweden, Norway and Denmark, and Japan, but the most continuous and striking rise under the head of exports as under that of imports has been in the case of the Argentine Republic.

710. The last two tables of the trade statistics of the United Kingdom relate to a highly characteristic trade, one in articles that have been collected from many different parts of the globe, to be as widely distributed again in other parts. The wool of Australia and South Africa is sent by us to Germany, France, and the United States; raw cotton from America, Egypt, and India is redistributed on the continent of Europe; silks are imported from France and sent to Australia along with the numerous products of British industry destined for the same market, and so on. A great variety of articles of Eastern origin, including much Egyptian cotton, are exported by us to the United States. The commodities that make up this *entrepôt* trade, as it is called, are mainly such as are bought by British merchants to be resold to customers whether at home or abroad, so that they enter into the *entrepôt* trade only when bought on foreign or colonial account, but this trade also includes goods originally bought for countries abroad, but sent to this country on through bills of lading.[1] On the other hand it does not include the value of the goods transhipped at British ports in bond,[2] and these goods are partly made up of goods bought by British merchants for resale to any customer, partly of goods sent on through bills of lading.

711. That the central position of this country contributes to this trade would seem to be indicated by the fact that the table now referred to shows that since the period 1886–90 nearly three-fifths of the value of that trade has been carried on with the United States on the one hand and Germany, Holland, and Belgium on the other.

Still the great development of the *entrepôt* and transhipment trade is not to be ascribed solely to the geographical position of this country.

[1] In 1912 the trade under this head made up 22·6 per cent. of the value of the exports of foreign and colonial origin. See also next note.

[2] The aggregate value of such goods in 1913 was nearly 20 millions sterling. The inadequacy of the information given formerly in the official returns caused me to assume that the trade entered as transhipment trade included the whole trade under through bills of lading and nothing else, and accordingly in previous editions of this work to misrepresent the facts under this head.

Two other important factors may be pointed out as contributing to this result. One is the peculiarly one-sided character of British industries. The fact that so large a proportion of the exports of the country consist of manufactured goods of various kinds necessarily makes it dependent on other countries to an unparalleled extent for imports of foodstuffs and raw materials. The large trade with all parts of the world thus based on the country's own products and requirements necessitates the employment of the vast amount of shipping, which furnishes at the same time conveniences for an *entrepôt* and transhipment trade. The other important factor referred to as likely to stimulate the trade of this class is the enormous trade in coal and other bulky articles, the indirect results of which are likely to be favourable to this trade in much the same way as it promotes our import trade generally. How it does so is explained in pars. **165-169,** on which additional light is thrown by what is mentioned in par. **684.** In view of this consideration it is only what might be expected to find that the chief articles under this head are of comparatively high value in proportion to their bulk. Of the first eight mentioned in the table jute is the only one valued before the war at less than £60 a ton. A further circumstance favouring this trade is the number and situation of our seaports. Part of the *entrepôt* trade of the country, for example, consists in the exporting at Dover of wool imported at London, the exporting at Hull of raw cotton imported at Liverpool. As regards the destinations of such exports, the rise is most considerable in the United States. The increase in this trade to Russia is fairly large and to the Argentine noticeable.

712. While satisfactory progress in the leading British industries seems to be shown by the tables which we have been considering, it is no doubt true that even more rapid progress is shown by some of our competitors ; and, while it is true also that the development of native manufactures in foreign countries is in many cases aided by protective duties, this is not the sole circumstance to which their progress is due. We cannot put out of sight the fact that, however great the advantages of the United Kingdom may be for the carrying on of manufacturing industries and foreign commerce, these advantages were necessarily relatively much greater at a period when the British Isles had coalfields more or less developed and other countries had not, when these islands had already effected the change from domestic and hand-labour in spinning and weaving and other countries had not, than at a time when these changes have been brought about in other countries or are in rapid progress. Hence it was inevitable that foreign countries, and especially those provided by nature with coalfields or abundant water-power, should gain upon the United Kingdom in the great branches of industry to which modern machinery is chiefly applied, and gain all the more rapidly because they begin with the latest machinery and the most advanced organisation, while the older seats

of industry are inevitably burdened more or less with what is out of date. And though to us the growth of such rivalry may be the cause of temporary hardship, the result, as has been already hinted (**16**), must be regarded as on the whole satisfactory,[1] as tending in the direction of that equal distribution of industry and comparative stability which, we hope, it is the mission of commerce to realise. Moreover, the competition resulting from the development of hitherto neglected resources is likely, once the initial obstacles have been got over, to be keenest where there is most leeway to make up, and it may be that the recovery of some British industries in recent years is partly the result of the fact that competitors have partly exhausted their temporary exceptional advantages in their own or neighbouring markets. At the same time much depends on the conditions affecting individual industries.

713. Since the publication of the first edition of this work there have been four censuses of the United Kingdom, and the table below shows the rate of increase of population at these censuses of the different parts of the kingdom, as compared with the rate in 1871–81, and the most nearly corresponding figures for Germany and the United States (exclusive of Alaska, Hawaii, and Porto Rico).

Rate of Increase or Decrease of Population per cent. per annum.

—	1871–81	1881–91	1891–1901	1901–1911	1911–21
England . .	1·37	1·11	1·04	1·01	0·34
Wales . . .	1·12	1·11	1·22	1·64	0·84
Scotland . .	1·07	0·75	1·06	0·62	0·25
Great Britain .	1·32	1·06	1·14	0·99	0·46
Ireland. . .	−0·45	−1·06	−0·54	−0·16	—
United Kingdom .	1·03	0·79	0·95	0·87	—
	1871-80	1880-90	1890-1900	1900-1910	1910-1920
Germany . .	1·08	1·08	1·32	1·43	—
United States .	2·66	2·24	1·90	1·93	1·40

In all parts of the United Kingdom, it will be noticed, the rate of increase is low, at least as compared with the United States, and the increasing rate in two periods in one part, easily accounted for by the rapid expansion of the coal and metal industries, is not enough to counterbalance the diminishing rate in the other two parts of Great Britain and the absolute decline in Ireland. This fact is in itself significant. Demands are constantly made for more men for our mercantile navy, for agriculture, and for various industries, while it is notoriously the case that more men are finding employment in the service of the rich

[1] On the advantages of a more equal distribution of mechanical industry see some wise remarks in George Combe's *Lectures on Popular Education*, second edition, 1837, pp. 63–7.

and well-to-do, and in connection with amusement and education, including under one or other of these last two heads all the varied forms of literature. When such demands are made the population returns raise the question, Do the men exist to meet them ?

714. The question still remains, however, why there should be a slower rate of expansion in our own country than formerly. For that there are no doubt many reasons, but it is only proper for us here to inquire whether any geographical reasons can be assigned, and to answer this question it may be well to compare this country with other important manufacturing countries, such, for example, as the United States and Germany, in both of which the rate of increase of population is more rapid than in our own. Now it is an obvious consideration that the development of manufacturing or indeed any non-agricultural industries in any country involves the simultaneous development of agricultural industries somewhere ; but it is now (unlike what it was in Adam Smith's time) a familiar fact that that answering agricultural development is no longer necessarily in the same country. In the United States, and even in Germany, the agricultural development in correspondence with that of manufactures is still mainly within the respective countries, but it is not so in our own country. With non-agricultural industries, therefore, growing at a merely equal rate to that at which they are growing in our own country, that fact in itself would account for a more rapid expansion of the population in both the countries named. The force of this consideration will be seen to be all the greater when it is borne in mind that a great deal of the vast commercial and transport industry arising out of the supply of agricultural produce must be carried on in the countries in which that produce originates.

715. But further, the expansion of population in a manufacturing country implies a greater and greater degree of centralisation in manufacturing industries. Now it is to be noticed that while undoubtedly there are forces constantly acting in the direction of such concentration, there are others of an opposite tendency. The centralising forces are necessarily those most in the public eye. Enlarging factories, more and more complicated and expensive machinery, improvements in handling and transport, the growing magnitude of industrial combinations, all tend of necessity to attract the general attention, and sometimes to get spoken of with bated breath in awe-struck wonder. But it may be doubted whether the decentralising forces are not after all the stronger. There is good reason to suspect that the steadily growing strength of the decentralising forces is what urges on, perhaps rather too precipitately, the formation of those huge organisations that strike the imagination of the dullest. Our own country is certainly one with a highly centralised manufacturing industry, but it is not the only one, and it may be worth while to consider the action of centralising and decentralising forces generally

before returning to the consideration of the British Isles in particular.

716. First, we may note, as in favour of centralisation, the growing complexity of manufacturing processes, and the consequent demand for more complicated machinery and more highly skilled labour of all kinds. These things are to be met with solely in the most highly advanced manufacturing countries or regions. Such countries and regions accordingly tend to have a preponderating advantage in proportion to the complexity of the industry and the amount and degree of skilled labour involved. Hence under modern conditions the production of iron and steel, the manufacture of complicated machinery, and the chemical industries, are almost confined to such countries and regions, and in them tend to be highly centralised. Many of the changes of recent years in connection with these industries have been of such a nature as to emphasise this tendency.

717. Improvements in the means of transport also tend on the whole towards centralisation. They tend to increase the advantages of a distant relatively to a nearer centre of production, which has previously had an advantage solely in consequence of greater proximity to the market. Before the war there was continued improvement under this head, but it must be borne in mind that the improvements of that nature do not benefit different centres of production equally. This country being one that necessarily carries on all its external commerce by sea is most interested in improvements in ocean navigation (691); and it is at least probable that all the economies in ocean transport that have taken place in recent years through the enlargement of cargo vessels, the improvement of marine engines and boilers, the enlargement and improvement of harbours, and the improvement of the means of communication between the seaboard and the interior, have in the aggregate conferred more advantages on this country than any other. But even if this is true the significance of the qualification involved in the words 'in the aggregate' must not be overlooked. On the other hand, the improvement of the means of communication between inland centres of production and places that cannot easily be reached from the seaboard is obviously more in favour of those inland centres than of British seats of manufacture; and such improvements are constantly being effected by the extension of railways.

718. When railways are introduced into new lands adapted for the production of food and raw produce, that tends in a special degree towards the centralisation of manufactures. In the United States, the Canadian North-West, Argentina, Russia, and Siberia, the laying of railways in such regions has been steadily advancing, with the inevitable result of stimulating manufactures in different parts of the world in which such industries already existed.

719. Lastly, the progress of refrigeration and cold storage has also

acted powerfully in the same direction. It has added to the value of new and distant lands by making articles of food available in remote markets which formerly could not be thus supplied **(488, 489)**.

720. Turning now to the consideration of the decentralising forces affecting manufacturing industries, we should note, first, that in the countries in which such industries are first developed the resources most favourably situated for development, according to the circumstances of the time, are likely to be utilised first. In the case of coal, for example, the thickest and richest seams are those likely to be first used up. Unless, therefore, economies are effected in the method of working the mines, the cost of producing an equal quantity of coal is likely to become greater and greater. With respect to such resources these countries, to use the language of economists, are likely first to experience the operation of the Law of Diminishing Returns.

721. Further, the existence of local supplies of raw materials, local labour, and a local market are always tending towards the establishment of local manufactures where such advantages exist. In the initial stages of the development of a region of raw production, local labour and a local market may count for little in the starting of manufactures utilising the raw material, but they may quickly come to do so if the region is already thickly peopled, and only the production of the particular raw material is new. The same is true of the development of regions rich in coal **(200-205)**. Water-power with electricity as a hand-maid **(116)** is now daily becoming a more and more influential factor in the redistribution of industry, and is sure to become even more so as coal and other fuels become dearer. See also **514** and **515.**

722. If now in the light of these general considerations we turn our attention specially to our own country, and note that our commerce down to the outbreak of the war on the whole still continued to increase, but yet not so rapidly as that of some rival countries, it is enough to refer by way of explanation and comment to the considerations set forth in par. 712. In any case it may be confidently anticipated that in the near future developments will take place in South Africa, West Africa, Egypt, Mesopotamia, and China that must be more or less favourable to the expansion of British industry and commerce, at least in the first instance. That the United Kingdom must share largely in the expansion of commerce brought about by the development of the goldfields in South Africa may be taken for granted, but, on the other hand, it is not to be taken for granted that the share of British commerce in South Africa in the future will continue to be as great as it is at present. A large part of the expansion must be in the importation of machinery and other articles of metal, in which we are encountering a keener and keener competition from other countries. The reasons for anticipating a considerable development of commerce in Egypt and West Africa are given in the text (**1143, 1200, 1201**), and also as to China (**1107**). In the case of Mesopotamia the anticipation

is based on the grounds already stated in the first edition and now repeated with modifications in par. **1030**, and on the increased prospect of the Baghdad railway being completed within the near future.[1]

723. The local distribution of British manufacturing industries presents many points of interest, some of them purely geographical, some historical. In the case of the greatest of these industries, that of cotton, it is a noteworthy fact that it is almost wholly confined to a few localities in the west of Great Britain. In England the spinning and weaving of cotton are almost restricted to the west side of the Pennine Chain, mainly to that part of Lancashire which lies to the south of the Ribble; in Scotland, to Glasgow and other manufacturing towns in the west. The reason for this distribution is geographical. In the first place those are regions of cheap coal (**687**). But, secondly, both for the spinning and weaving of cotton a moist climate is of great importance, and in districts where the manufacture is carried on, dry weather, and especially cold and dry weather, adds considerably to the expense of the operations; for where the air is too dry the yarn is liable to become brittle through losing its natural moisture, and all the more likely is this to result when, as on cold days, the temperature of the spinning-'mill' or weaving-'shed' is much above the temperature of the air outside. So important is this factor in the cotton industry that the failure of cotton factories started in other parts of England has been attributed in some cases to no other cause. Even the shelter of a hill against dry east winds is considered a matter of high pecuniary value. For the spinning of the finer yarns more particularly this advantage is so great that it should be reckoned along with the others mentioned in par. **711** as favouring this country as a seat of the industry. It is this circumstance that causes the number of British cotton spindles to be so high in proportion to the quantity of raw cotton consumed.[2] Why the parts of the British Isles just referred to should be specially moist will be readily understood from what is stated under general headings as to the effect of high grounds on moisture-laden winds (**64**) and the prevalence of such winds from the south-west in this part of the world (**53**).

724. In England the town[3] most closely associated with the cotton

[1] The preceding paragraphs **712-722** were written nearly as they stand before the war, and all that can be profitably added is that they must now be read in the light of what is stated in par. **30**.

[2] Thus in the year ending August 31, 1912, the consumption of raw cotton per 1,000 spindles in Great Britain was 77·3 bales against 167·6 in Germany, 261·9 in Russia, 363·8 in India, 662·0 in Japan, 177·1 in the United States, but only 70·1 in Switzerland with its mountainous surface and humid climate.

[3] The populations of towns in Great Britain given at the foot of the page are those of the Preliminary Reports of the Population enumerated on June 19 and 20, 1921, but with the figures rounded. The populations as given in that report seem to suggest some interesting considerations, but, as the Report warns us (p. xv.), one must be careful to remember that changes in population within municipal boundaries do not necessarily indicate changes in the population of urban aggregates (1313). Comments on the figures are accordingly eschewed

industry is Manchester. This is one of those towns which owed their original importance in a large measure to the fact of their lying in a plain just on the border of hill country, a position which, as already explained (**194**), naturally leads to the convergence of roads from many parts of the plain as well as from one or more valleys among the hills. It is hence natural to find that a town has been situated in this position from a very early date. Manchester (the ancient Mancunium) was already in existence in the time of the Romans, and in the early part of the fourteenth century it became known as a manufacturing town through the settlement of Flemings here. But the first materials of its textile manufactures were wool, a local product, and linen yarn obtained from Ireland. It is uncertain when cotton was added to these, and though Manchester cottons are spoken of even in the fourteenth century, it was not till long after that pure cotton fabrics were made there, or anywhere else in England (**369**). Since the great inventions of the eighteenth century, Manchester has grown with the cotton industry, the trade in cotton goods and yarns having always been centred here (**199**). In 1774 Manchester and Salford together had a population of little more than 27,000; at the census of 1801 the joint population of the two townships had risen to 84,000. (Compare **370.**) In 1891 the population within a radius of twelve miles of Manchester Exchange was upwards of 1,600,000.[1]

725. Among the surrounding towns engaged in the cotton industry are Oldham, Bolton, Bury, Rochdale, and other towns which have enriched the bleak Lancashire moorlands to the north and east of Manchester, Stockport and Hyde in Cheshire to the south, and Glossop in a Derbyshire valley south-east of Manchester: all situated on the great coalfield west of the Pennine Chain; and further north are Preston, Blackburn, Accrington, and Burnley, all Lancashire towns, and the last three likewise situated on the same coalfield. Oldham and Bolton are the two towns most noted for cotton-spinning mills,

here. How futile it would be, *e.g.*, to comment on the fact that the population of (the municipality of) Bradford has actually declined since 1911, when it may be that the urban aggregate of Bradford has increased in numbers. The populations of urban aggregates it is unfortunately impossible to give, but when different municipalities are known to the author to be contiguous, their populations are combined. What sense would there be, from a geographical point of view, in giving the population of Manchester separately from that of Salford, when the ground on which Salford stands is so mortised into that of Manchester that probably few Manchester people are aware that the principal railway station of Manchester is in Salford?

[1] In 1911, considerably over 2,100,000, in 1921, above 2,200,000.

Manchester and Salford .	950,000	Stockport . . .	125,000
Oldham . . .	150,000	Preston . . .	120,000
Bolton	180,000	Blackburn . . .	125,000
Bury	55,000	Burnley . . .	100,000
Rochdale . . .	90,000		

the former being engaged chiefly in the production of medium yarns, the latter of the 'higher counts.'[1] The northern towns of Burnley, Blackburn, Preston, Nelson, and Accrington,[2] all situated along the route of the railway from Preston to Skipton, take the lead in cotton-weaving. All these towns are just at the base of the Pennine Chain, some at a level of above 500 feet. Wigan, though it is also a cotton-manufacturing town, is notable chiefly as the principal centre of the coal-trade in Lancashire.

726. For its supplies of raw cotton the great cotton manufacturing region of England is still dependent mainly on Liverpool, but direct shipments of cotton now come to Manchester by means of the ship-canal constructed between 1887 and 1893 and opened for traffic on the first day of 1894. It extends from Eastham on the south side of the Mersey to the heart of Manchester, has a total length of 35½ miles, and a minimum depth of 28 feet. There are three entrance locks at Eastham, the largest of which is 600 feet long by 80 feet wide, and the bottom width of the canal at the full depth is, with a few exceptions, 120 feet, which is sufficient to allow of large ships passing one another, and at the bend at Runcorn the width has been increased to 175 feet. The port is provided with graving docks, large grain elevators, oil tanks, cold storage accommodation, and other modern equipment. There are now regular lines of steamers to ports in nearly every part of the world.[3] The traffic of the port, which extends to Ince and thus includes Runcorn, has grown steadily and rapidly.[4] In the case of the Manchester ship-

[1] In 1900 there were no fewer than thirty-five towns in South Lancashire and the parts immediately adjoining which had at least 100,000 spindles engaged in this industry, Oldham heading the list with nearly 12 millions and Bolton following with 5 millions. In 1914 the number of spindles belonging to the Oldham federation was 19 millions, to that of Bolton, 9 millions.

[2] These were the only towns which in 1900 had each more than 30,000 power-looms.

[3] For Black Sea ports, however, transhipment is necessary at Constantinople, and for the oil-ports of Tampico and Tuxpam, the only Mexican Gulf ports with which a regular connection is maintained, transhipment takes place at New York.

[4] In 1894 the total value of the trade of the port was £6·9 millions (about 40 per cent. imports), in 1912 it amounted to £56·7 millions (62 per cent. imports). The total tonnage of the traffic in 1913 was 5·78 million tons, of which 5·46 millions was seaborne. The total capital expenditure on the canal down to the end of 1913 was nearly £17,000,000, a large part of which consisted of debentures and upwards of one million sterling preference stock belonging to the corporation of Manchester. The first dividend on this stock (2½ per cent.) was paid for the year 1915.

As the nature of the case renders the growth of the port of Manchester of peculiar interest some details are given in the table overleaf.

It will be observed that petroleum, an article of comparatively small value in proportion to its bulk (see the table of prices in the Appendix), an article largely conveyed in special steamers and in the form in which it enters into consumption by the multitude, is the commodity in which the trade of Manchester has grown most rapidly to the prejudice of that of Liverpool. This is a natural result of the better situation of Manchester with reference to a consuming population. In paper-making materials we have another bulky article, and in relation to it we

Wigan	90,000

canal it has also to be borne in mind that its whole length is laid through a part of the busiest industrial region of England, so that it may be looked upon as destined to form a double line of quays with a total length of 70 miles.

727. At a distance from the Manchester district the only large town in which cotton manufactures form the staple industry is Nottingham, on the Trent, in which certain branches of the manufacture, that of cotton hosiery, and the making of machine-made net and lace, have their chief seat. In these branches of the industry the yarns used are mostly strong and not exposed to any great strain in the processes of manufacture, and hence a moist climate is not so essential to success as it is in the branches carried on in Lancashire. (See also par. **656.**)

728. In Scotland, though cotton manufactures are carried on

have to consider the situation of the mills, and with reference to that again the situation of the streams supplying the water and that of the consumers of the product. Raw cotton is by far the most valuable of the articles imported at Manchester. The growth of that import as compared with the corresponding import at Liverpool was for a considerable period steady, though slow, and appears now to have been checked. It shows the difficulty of displacing an old market requiring a high degree of organisation, but it seems probable that the advance of Manchester under this head will go on at an accelerated rate when the growth in the total trade has reached such a point as to favour higher organisation of the market. The hold which Liverpool retains on the export trade of cotton tissues is not surprising to any one who considers the widespread distribution of the markets for these products (**377**), and the relations of the chief weaving towns (**726**) to the ports of Liverpool and Manchester respectively. Among recent developments, all illustrative of the influence of an enormous consuming population in the immediate neighbourhood, may be mentioned the import trade in frozen meat, wool, and tea. The first large cargo of wool from Australasia reached the port in July 1916, and large provision has now been made for this trade.

Principal Articles of Trade of the Port of Manchester. Percentage of the Total Trade of the United Kingdom in the Articles Named at Liverpool (L.) and Manchester (M.) by Quantity (Machinery by Value).

Imports		1893	1894	1906	1912
Raw cotton	L	92·3	90·5	77·7	79·3
	M	—	1·6	16·6	16·6
Paper-making materials	L	10·8	10·4	3·0	1·8
	M	—	4·1	14·3	10·9
Wood, sawn and hewn	L	9·2	8·2	6·6	8·4
	M	—	1·2	5·6	5·2
Manganese ore	L	—	—	20·6	20·3
	M	—	—	7·3	10·3
Petroleum	L	22·4	19·9	9·9	8·3
	M	—	0·3	12·1	9·8
Wheat	L	28·9	25·3	25·6	23·0
	M	—	0·1	5·3	7·8

Imports		1893	1894	1906	1912
Maize	L	25·0	24·9	22·9	17·7
	M	—	0·1	2·4	2·4
Bacon and hams	L	63·3	61·7	51·4	34·9
	M	—	—	1·9	1·2
Exports					
Cotton tissues	L	75·9	74·2	69·0	66·2
	M	—	3·6	9·1	12·3
Cotton yarn	L	39·4	35·7	34·2	31·2
	M	—	17·2	22·2	25·2
Woollen and worsted tissues	L	48·2	40·3	57·2	32·1
	M	—	0·5	2·6	3·5
Machinery, &c.	L	34·3	31·2	32·4	32·9
	M	—	2·1	5·1	5·6

Nottingham . . 250,000

very largely, the only town whose name is specially associated with a branch of this industry is Paisley, in Renfrewshire, where the manufacture of cotton thread has its chief seat. The cotton fabrics mostly made in Scotland are very fine lawns, muslins, and certain kinds of figured and coloured dress goods.

729. The West Riding of Yorkshire, where there is another large coalfield, is for the **woollen industry** of Great Britain pretty much what Lancashire is for the cotton industry, though this section of the textile manufactures of the country is not so restricted in its range as the other. The principal centre of the trade of this region is Leeds, which occupies a situation geographically very similar to that of Manchester.

730. Leeds stands on the Aire amidst the gently undulating country that lies between the broad flat Vale of York and the narrow dales on the west. It thus has free communication with the north, east, and south-east, and on the west it commands two principal lines of communication, one by the valleys of the Calder and Colne to Manchester and South Lancashire, the other by the valley of the Aire to Mid Lancashire. Like Manchester, it is a very old seat of trade and manufacturing industry. It is described by Camden (1607) as 'much enriched by the woollen manufacture,' and nowadays, while still retaining its importance in the woollen trade, it has added to that many other important industries. Besides being the chief centre of the wholesale clothing trade in the country, it probably stands first also in the leather trade, and is developing large iron and steel manufactures.

731. The narrow dales of Yorkshire to the west of Leeds are filled with larger or smaller manufacturing towns engaged in the woollen industry. In some of them its origin belongs to as remote a date as in Leeds itself, these dales 'well supplied with water, fuel, and cheap provisions,' and surrounded by sheep pastures yielding a fine lustrous wool, having been among the localities to which the woollen industry migrated at the close of the middle ages, when the expense of living hindered its prosperity on more ancient seats nearer London. In Wakefield and Halifax as well as in Leeds foreign artisans were settled by Henry VII. in 1489, and a generation later Halifax was already noted for its products in this branch of manufacture. When modern machinery was introduced the abundance of coal in the region served to stimulate the industry in those valleys still further, and many of the towns now engaged in the manufacture date their rise only from that period.

732. At the present day the centre of all branches of the worsted manufacture is Bradford, which is situated in a small basin among the hills to the west of Leeds and a little to the south of the Aire. Here the primary advantage seems to have been abundance of pure water

Paisley . . .	90,000	Leeds . . .	450,000

suitable for the scouring of the wool, an advantage which the corporation of the town has taken care to preserve as the industry increased. The worsted industry is another of those industries in which the abundance of capital is of peculiar importance. The combing of the wool is a highly specialised industry involving the use of complicated machinery, but employing mainly the labour of young girls and boys. To be carried on economically accordingly it must be carried on on a large scale.[1] Bradford has likewise large silk, velvet, and plush mills (in which the raw material used is schappe or spun silk—**350**), and close beside it on the Aire itself is the model town of Saltaire with its great alpaca works (**324**). Halifax in the Calder valley is now known for its lighter worsted fabrics, its baizes and carpets. Huddersfield on the Colne, a tributary of the Calder, though not even mentioned by Camden, is now pre-eminent in the manufacture of high-class fancy goods as well as plain fabrics. Dewsbury and Batley manufacture heavier fabrics, including blankets and shoddy. Wakefield, Barnsley, Keighley, Morley, Heckmondwike, and many others in this area are engaged in some branch of the great industry. Even on the west side of the Pennine Chain there are some towns that still carry on their old woollen manufactures. Rochdale has flannel mills, and Bury, Ashton, and Glossop all manufacture woollens of some kind ; Denton and Stockport have large felt hat factories.

733. The district in the west of England that early became known for its ' cloths ' as distinguished from the ' stuffs,' for which the bulk of English wool was best adapted (**315**), still retains its renown in connection with this manufacture, and especially for the making of broadcloth. In some of the towns in which the industry was formerly pursued it has died out, but it still flourishes at Stroud in Gloucestershire and in the Stroud valley generally, and at Bradford and Trowbridge in the west of Wiltshire.

In the far north it is interesting to note that Kendal still retains something of the industry for which it was already known before the close of the fourteenth century, but in the east of England, where numerous towns were once noted for their woollen or worsted goods, even Norwich has lost nearly all its textile industries, although in virtue of the advantages due to its central situation in a fertile part of the country and to its still being accessible by sea, it continues to carry on important manufactures of one kind or another (mustard, starch, stoves, boots and shoes, agricultural implements, &c.).

734. Leicester, throughout its history as a manufacturing town, has been the chief seat of woollen hosiery in England, which is no

[1] See an article by L. D. H. Weld on ' Specialization in the Woollen and Worsted Industry ' in the *Quart. Jour. Economics*, Nov. 1912.

Bradford . . .	300,000	Leicester . . .	230,000
Halifax . . .	100,000	Norwich . . .	120,000
Huddersfield . .	110,000		

doubt in a large measure due to the fact that the Leicestershire breed of sheep yields one of the finest wools for the making of worsted yarn (**329**), and more recently to its lying on a coalfield. The making of lace and elastic webbing has been added to its textile industries. Kidderminster in Worcestershire and Wilton in Wilts are still celebrated, as they long have been, for their carpets; but it is to be noted that 'Brussels' carpets (**329**) are the specialty of Kidderminster. The so-called Kidderminster carpets are made chiefly in Scotland and the Yorkshire woollen district.

735. In Scotland woollen manufactures form the staple industry chiefly in certain towns in the basin of the Tweed, Hawick and Jedburgh, Galashiels, Selkirk, and Innerleithen, which are chiefly noted for the kind of fabric appropriately known as tweeds, in the making of which, however, they now have a rival in Dumfries, as well as in many of the Yorkshire manufacturing towns. The prosperity of some of these towns was greatly promoted at one time by the abundance of water-power afforded by the streams, but nowadays this source of power is not much used, and the continued prosperity of the industry of the district is all the more striking from the fact that it lies remote from any productive coalfield. Though the counties of Roxburgh and Selkirk are said to carry more sheep per acre than any other part of the world, and this fact must have contributed greatly to the origin of the industry, the local supplies of wool no longer meet a tenth of the requirements. Besides tweeds woollen hosiery is a large manufacture of this district. Of the two most important of the manufacturing towns mentioned, Galashiels and Hawick, both situated on one of the main lines of railway from Edinburgh to Carlisle, Galashiels at the point whence a branch runs up the Tweed valley towards Glasgow, Hawick is specially devoted to this latter branch of the woollen industry. Hosiery is largely manufactured also at Dumfries, Edinburgh and elsewhere, and carpets and other woollen goods are made at Glasgow, Ayr, Kilmarnock, Edinburgh, Perth, and Stirling. In general it should be noted that the woollen and worsted goods manufactured in all the outlying parts of the United Kingdom are of relatively high value, in the production of which cheap skilled labour compensates the lack of other advantages enjoyed by the West Riding.

736. In Ireland the woollen industry was checked by the repressive measures of the English Parliament at the close of the seventeenth century, but, as in England and Scotland, woollen goods of high quality are now made in many places in the country. The great textile industry of Ireland is, as it long has been, that of linen (**305-7**). In modern times this latter industry has undergone the process of concentration that has affected all others, and in Ireland the manufacture is now nearly confined to Belfast and the district around. In this district it first received an important stimulus at the end of the seven-

Belfast . . . 400,000

teenth century through the settlement of some Huguenot families, after the revocation of the Edict of Nantes, at Lisburn on the Lagan above Belfast. The linens of Belfast and the neighbourhood include those of the finest quality, and one great advantage enjoyed by the district for the production of such goods is the excellence of the spring-water used in bleaching, so that linens woven even in Bohemia, it may be from Belfast yarns, are sent to Belfast to be bleached. For the finest linens flax is imported from Belgium (**800**), but large quantities are also imported from Russia. In Scotland the chief centre of the linen manufacture is Dundee, but there, as well as in Arbroath, Montrose, and one or two other eastern towns, it is chiefly the coarser linens that are manufactured, the raw material all coming from Russia or other parts of the Baltic. This branch of industry has been mainly carried on in Scotland north of the Firth of Tay since the eighteenth century, and its predominance in those parts may perhaps be ascribed to the fact that the ports of that part of the country are the first reached by ships that round the north of Denmark. Dunfermline in the west of Fife has been noted for its damask table-linens since the early part of the eighteenth century. In England linen is the staple industry of the Yorkshire town of Barnsley, and fine linen damasks are largely made at Canterbury. Besides Dundee, Sunderland, Stockton, and other seaport towns carry on large manufactures of sailcloth.

737. Jute yarns and **tissues,** though mainly exported from London, Liverpool, Glasgow, and other ports which carry on most of the trade with the countries requiring these materials for the making of sacking, are still manufactured most largely at Dundee, where the industry was first introduced in this country. In England it has considerable importance at Barnsley.

738. The **silk industry** of the British Isles is almost confined to England, and is still pursued principally in the district where it was first firmly established, Derbyshire and the neighbouring parts of Staffordshire and Cheshire, where the streams furnish pure water, an important requirement of this manufacture. Derby, Ilkeston, and Chesterfield in the first-named county, Macclesfield and Congleton in Cheshire, Leek in north Staffordshire, are among the towns chiefly engaged in this pursuit. Leek is specially noted for its sewing thread and its silk-dye works, the water of the neighbourhood being among the best dyeing waters of Europe. Silks of one kind or another are also made in many other places. Coventry, once noted for its ribbons, now carries on a rapidly growing industry in artificial silk. Silk plush for hats is largely made in Leicestershire ; velvets and plushes, as already mentioned, are manufactured at Bradford (Yorks), and there are also silk factories in the valley of the Kennet in Berkshire. The industry was introduced by the Huguenots into London, and the

Dundee . . .	170,000	Coventry . . .	130,000
Derby . . .	125,000		

manufacture of umbrella silk is still carried on there in Spitalfields and Bethnal Green. Costly brocades and velvets are made at Braintree in Essex, and Sudbury in Suffolk.

739. The products of the various textile industries of which the chief seats have just been indicated made up (if we include apparel, millinery, &c.) in the period 1881–85 very nearly 50 per cent.[1] of the total value of the British exports of native produce and manufactures. Next to them collectively, next to cotton manufactures separately, came in this respect iron and steel and their products, which, if we include among them steam-engines and machinery of all kinds, hardware and cutlery, made up in the period mentioned rather more than 18 per cent. of the exports of the United Kingdom.[2]

740. The chief seats of iron-smelting are at and round Middlesbrough in the North Riding of Yorkshire and the south of Durham (**687**); in South Wales and the adjoining part of Monmouth round Merthyr Tydfil in the north of Glamorganshire, at Newport at the mouth of the Usk (Monmouth), and elsewhere; in north Lancashire and Cumberland at Barrow, Workington, and many other places conveniently supplied with red hematite from the neighbouring deposits (**687**); in Lincolnshire, especially north Lincolnshire (Frodingham and Scunthorpe), Northamptonshire and south Staffordshire; in the West Riding of Yorkshire; in Oxfordshire and Kent; in Lanarkshire, at Airdrie, Coatbridge, and other places in the basin of the Clyde, and in north and east Ayrshire and at Falkirk (Carron works in the Forth basin). Unfortunately the Cumberland coal is not generally suitable for iron-smelting, and most of the fuel has to be brought to this district in the form of coke from the east of England, a distance of 75 to 100 miles. Both Cumberland and Lanarkshire are becoming increasingly dependent on Spanish ores.

741. The towns and seaports of Barrow and Middlesbrough have both risen into importance since about the middle of the nineteenth century through the working of the iron ores in their vicinity. The hematite ore near Barrow was held in high repute long before facilities existed for working it on a single scale. These facilities were first provided by the opening of a short line of railway from the quarries to the coast. Furnaces and ironworks rapidly rose up, and an excellent harbour has been simply formed by the enclosure of the channel between the mainland and the small island opposite. Middlesbrough, which is situated on the south side of the Tees, and accordingly in Yorkshire, owes its rise to a bed of iron ore, previously discovered in the valley of the Esk, near Whitby, being traced in 1850 to the vicinity of the present town. The situation of Middlesbrough being convenient

[1] In 1911–13 less than 40 per cent.

[2] In 1896–1900 about the same proportion; in 1911–13 almost 20 per cent.

Middlesbrough . .	150,000	Newport . . .	100,000
Merthyr Tydfil . .	75,000	Barrow . . .	75,000

for obtaining supplies of coke from north Durham and the Tyne, and of limestone (**529**), which crops out on the surface within a distance of 40 miles to the north-west, thus presented all the conditions for the establishment of a great iron industry. To make it at the same time a great seaport all that was necessary was to dredge the estuary of the Tees to a depth sufficient to admit large vessels, and to create a harbour protected from the waves of the North Sea. Both of these objects have now been accomplished, the latter by the construction of a breakwater, the material of which consists of the scoriæ from the neighbouring blast-furnaces. The ores for the iron industry of South Wales and Monmouthshire are now mainly of Spanish origin (**534**). The ports of Newport, Cardiff, and Swansea receive a large proportion of the iron ore imported into the United Kingdom, but this commodity also comes in large quantity to Glasgow and Ardrossan, Middlesbrough, and the Tyne ports.

742. The relative decline in the iron industry of the United Kingdom, indicated by the figures in par. **539,** reveals a growing competition on the part of other countries also in this department of British industry. In keeping with this, we find in recent years a tendency in the iron industry to become concentrated in the maritime centres of production, a fact which serves at once to mark in another manner the increasing keenness of competition, and to illustrate the advantage that Great Britain owes to its easily reached sea-board. Ironworks in the West Riding of Yorkshire, in Staffordshire, and Shropshire have been transplanted to the coast. The excellent dock and river-side accommodation at Newport, together with the other advantages of that place, is attracting thither ironworks of various kinds from the Midlands. Another effect of the keen competition in this industry has been an agreement under which the articles of iron and steel mostly used in engineering are to be produced in large quantity in standard sections, and a great economy thus secured in their production. The leading British purchasers of such articles have agreed to order only the sections fixed by a committee appointed for the purpose. This favours the production of such articles at rolling-mills in the neighbourhood of the blast-furnaces, but the situation of iron and steel manufactures of a more advanced kind is influenced by other circumstances.

743. In connection with the manufacture of articles made from iron, two towns in England are specially noteworthy—Birmingham and Sheffield, both being towns which became engaged in the working of metals at a very early date, and have grown to a large size through the prosecution of such industries down to the present day.

744. Birmingham lies almost exactly in the middle of the plain between the rivers Trent, Severn, and Avon. The surrounding forests

Cardiff . . .	220,000	Birmingham . .	900,000
Swansea . . .	160,000		

(**527**), together with abundance of iron ore in the neighbourhood, seem to have determined the form of the industry which grew up here. The smiths of Birmingham are mentioned as early as 1538. Under the name of Bremicham the town is described by Camden in 1607 as 'swarming with inhabitants, and echoing with the noise of anvils.' In 1727 its iron and hardware manufactures were estimated to employ or support upwards of 50,000 people. At the present day not only does Birmingham itself swarm with inhabitants and echo with the noise of anvils to a much greater extent than ever it did before, but the whole of the adjoining part of South Staffordshire is crowded with large and small towns, Wolverhampton, Walsall, Wednesbury, West Bromwich, to which may be added Dudley[1] (in a detached part of Worcestershire), the inhabitants of which are all mainly engaged in similar occupations—the making of all kinds of articles in steel and iron, as well as other metal wares, from the largest to the smallest. All kinds of domestic ironmongery are the chief products of this district, but steam-engines and machinery, as well as needles, pins, and buttons, are also important articles of manufacture. Bromsgrove, Redditch, and Stourbridge in Worcestershire belong to the same group of towns in respect of the nature of the industry which they carry on. Redditch is the most important place of manufacture of needles and fish-hooks in the world.

745. Sheffield lies in a hollow in the extreme south of Yorkshire. The neighbourhood supplies both coal and iron as well as water-power and excellent grindstones (**571·16**), long used in the making of cutlery, including fine cutting tools and the best tool-steel. A great stimulus was given to this industry by the discovery in 1740 by Huntsman, a Sheffield cutler, of the improved method of making cementation or crucible steel (**531**). But since the introduction of the Bessemer process of steel-making here in 1858 Sheffield has become the seat of steel industries on a much larger scale, making ships' plates, armour-plates, tires and axles, ordnance, and all kinds of steel castings and forgings. For the finest work it has for hundreds of years imported the best raw material from Sweden (**528**).

746. Many other towns in England are known chiefly in connection with one or more branches of the iron and steel industry. The making of rails is a rolling-mill industry naturally carried on in the neighbourhood of the blast-furnaces, and especially those favourably situated for export, as at Middlesbrough and Barrow. Warrington, on the Mersey, in Lancashire, produces iron wire, &c. The making of tin- and zinc-plate, a highly specialised industry of old standing and working mainly for export, is scattered over all the industrial towns, and especially seaports, of the South Wales coalfield (Swansea, Llanelly,

[1] The aggregate population of the continuous urban area comprising Birmingham and all these towns was in 1921 over 1,300,000.

Sheffield . . .	500,000	Warrington . .	75,000

Cardiff, Newport, Neath, Monmouth, Pontypool, Aberavon, &c.). The making of machinery for textile manufactures [1] is carried on mainly, if not wholly, in some of the towns in which these manufactures form the staple industry. Cotton-spinning and weaving machinery is made at Manchester, Oldham, Bolton, Accrington, and other towns in the cotton-manufacturing district. In the same towns machinery belonging to the woollen industry is also made, but the great machine-making town for all departments of the worsted industry in particular is Keighley, in the Aire valley, north-west of Bradford. Machinery for the manufacture of elastic webbing is made at Leicester.

747. Steam-engines and railway-carriages are made at Manchester, Birmingham, Glasgow, Newcastle, Darlington, and several smaller towns, where different railway companies have established such works for their own lines. The London and North-Western Railway has an establishment of this kind at Crewe in Cheshire, the Great Western at Swindon in North Wilts, the London and South-Western at Eastleigh near Southampton, the Great Northern at Doncaster, the Midland at Derby, the Cambrian at Oswestry, the Glasgow and South-Western at Kilmarnock. In the selection of such places the companies have obviously been guided by the desire to find a place on their own line where land was cheap, rather than places in the vicinity of coal and iron supplies, which they can carry themselves at a minimum of cost. Openshaw, a suburb of Manchester, has large manufactures of armour-plate, and other heavy steel castings of heavy guns and hydraulic and other machinery. Agricultural machinery and implements [1] are made in many towns belonging to the corn-growing districts, as at Lincoln, Grantham, Gainsborough, Norwich, and Ipswich. These are all towns near the chief home market, sufficiently large to have convenient means of transport, and sufficiently small for land to be obtainable at a reasonable rate for the large areas required for such works. Chelmsford, Ipswich, Preston, and other seaports are becoming increasingly important as engineering centres, including electric engineering. In the period of industrial reconstruction following the war mass production or output at rapid rates on standardised lines has been adopted in many industries over the country where machines installed for the making of munitions are now available for industrial undertakings. The electrical industry has developed greatly as at Lincoln, which specialises in steam and electric wagons. London, Birmingham, Coventry, Newcastle, and the Glasgow area are largely engaged in various divisions of the motor industry.

748. Not very many years ago the Thames was the chief seat of shipbuilding in Great Britain, and it was the change from wood to

[1] The Census of Production, 1907, Report estimates that about three-quarters the value of the textile machinery and about four-fifths of that of the agricultural machinery made in this country are exported. The total value of engines and machinery produced is given in that report at £43,103,000, of which textile machinery accounts for £12,924,000, rail locomotives £4,423,000, boilers £3,387,000, and machine tools £2,715,000.

iron as the material for that industry that transferred the industry to the Clyde and other northern rivers. This latter river is now the chief seat of shipbuilding in the world—of shipbuilding in all its branches, including the making of marine engines. Shipbuilding yards succeed one another for miles below Glasgow, and are met with at other places lower down, especially at Dumbarton and Greenock. Next to the Clyde in shipbuilding come the Tyne, the Wear, the Tees, and the Hartlepools, and in Ireland Belfast. To a less extent the industry is carried on at Hull, Liverpool, Barrow-in-Furness, Southampton, &c. There are government dockyards at Chatham and Sheerness in the Thames, at Portsmouth, Devonport, at Pembroke on Milford Haven, at Haulbowline on Cork Harbour, and at Rosyth in Fifeshire, on the north side of the Firth of Forth just above the Forth Bridge. During the war a national shipbuilding yard was established at Chepstow in Monmouthshire, but this was sold in 1920.

749. Coal and coke, the next articles to iron and its products among British exports of domestic origin, are chiefly exported from Cardiff, Newport,[1] and Swansea, the outlets of the South Wales coalfield, and the Tyne ports (Newcastle and North and South Shields), Sunderland, and Hartlepool, the outlets of the Northumberland and Durham coalfields, and from various ports on the Firth of Forth. The excellence of the so-called smokeless (that is nearly smokeless) coal furnished by the eastern part of the South Wales coalfield as fuel for steam-engines has caused Cardiff to outstrip Newcastle in the export of coal to foreign countries, but Newcastle and Sunderland still rank first among the ports which supply coal in coasting vessels for domestic use, their convenient situation for the supply of London being much in their favour. The actually smokeless coal known as anthracite is produced only in the western part of the South Wales field, a smaller quantity in the Glasgow district.

750. Next to coal among British exports of native produce and manufactures comes copper, with the various articles made out of that metal. As far back as the time of Queen Elizabeth, Swansea had a large business in the smelting of copper ores brought from Cornwall and Devon, the only English counties where this metal is found in great abundance. This business still continues, but nowadays not only copper ores, but also those of silver, zinc, lead, and sulphur, are brought hither from all parts of the world to be smelted, and more or less of the resulting metal is re-exported as British produce. Llanelly, in Carmarthenshire, shares in the industries of Swansea.[2] In the making of articles from copper alloys, brass, bronze, &c., Birmingham

[1] Newport has been provided with a dock 95 acres in extent, which can be reached at almost any state of the tide by a lock of 1,000 by 100 feet.

[2] At Skewen, previously a barren area, near the town, oil refineries have been (1920) erected and connected with Swansea docks by pipes through which crude oil will be pumped and refined oil returned for shipment.

Portsmouth . .	250,000	S. Shields . . .	120,000
Newcastle-Gateshead .	470,000	Sunderland . .	175,000

takes the first place, as it does in all kinds of hardware; but Rotherham, on the Don, is also noted for its manufacture of brass.

751. Among British ores, lead and tin are now of more importance than copper, and both of them, being comparatively easy of treatment, are smelted chiefly in the neighbourhood in which they are produced. Lead is obtained most abundantly in the Isle of Man, the west of Durham, and other northern districts; tin chiefly, like copper, in Cornwall and Devon. A beginning has been made (1921) with the working of extensive lodes of rich copper ore in Shetland to the south of Lerwick.

752. The making of earthenware and porcelain is another industry which involves a great consumption of fuel, and is hence carried on in this country mainly in coal-yielding districts. It is explained elsewhere (**592**) why the making of the greatest variety of earthenware has come to be carried on mainly at Stoke-on-Trent in north Staffordshire, a county borough in which are now incorporated the former 'pottery' towns of Burslem, Tunstall, Hanley, Fenton, and Longton, as well as Stoke. Worcester and Derby have long been noted for their porcelain. Stourbridge makes a very hard kind of stoneware from fireclay (**571·18**) found in the neighbourhood.

753. Glass also is made, for the same reason, chiefly on or close to the coalfields, at St. Helens in Lancashire, at Birmingham, at Dudley and Stourbridge in Worcestershire, at South Shields, at Glasgow; glass bottles at Castleford, Doncaster, Rotherham, and other places in Yorkshire. As common salt is the chief material used in the making of 'alkali' (**603**), this product is largely made in the chief salt-yielding districts of England. Of these by far the most important is that in the valleys of the Weaver and Wheelock in Cheshire, with the towns of Northwich, Middlewich, Winsford, and Sandbach, Droitwich and Bromsgrove in Worcestershire, and more recently on both sides of the Tees (Port Clarence in Durham, Middlesbrough in Yorkshire), in north Lancashire (at Preesall, near Fleetwood, and on Walney Island), at Stafford, and elsewhere. The chief seats of the alkali works of the country are Widnes, at the head of the estuary of the Mersey on the Lancashire side, and Flint, both near the Cheshire salt district; and works of the same kind exist on the south Durham salt district, at South Shields, St. Helens, Swansea, &c. The great manufacture of dyestuffs which has sprung up since the war (**608**), being also one that uses large quantities of bulky raw materials, has its principal seats on waterways—on the Thames, at Silvertown and elsewhere, on the Mersey and the Manchester ship-canal, at and near Huddersfield, at Grangemouth on the Firth of Forth.

Ardeer, near Irvine, one of the most important centres in the country of the manufacture of explosives, is on a site deliberately

Stoke-on-Trent . .	250,000	Widnes . . .	50,000
St. Helens . . .	100,000	Huddersfield . .	110,000

chosen on a sandy foreshore, because while near a seaport the sand-dunes afforded a natural isolation for the different works of this dangerous industry.

754. A few of the British industries in which a cheap supply of coal is of less importance than other requirements may now be noticed. In the manufacture of paper a supply of pure water is for the most part essential, and hence this industry is mostly carried on in districts that still contain pure streams and at spots not far from the great markets (large towns). The vast quantities of cheap bulky material used in the industry also contribute to its localisation, favouring its growth at or near seaports well placed for the sale of its products, a situation of which the vast Gravesend works form a recent illustration. From the first introduction of paper-making into this country, the chief seats of the industry have lain in Kent (at Maidstone and elsewhere), and the manufacture is also largely carried on by the streams of Derbyshire and Mid Lancashire (Darwen, Bacup, &c.), on the Kennet in Berkshire, in the Wycombe valley in Bucks., in Midlothian and Fifeshire. Dyeing (at least in the case of the more delicate shades) requires the same condition, and, where associated with bleaching, pure air is necessary over and above. It is hence characteristically an industry of small rather than large towns. Perth is the seat of some of the chief dye-works in the Kingdom; Dumbarton, Accrington, and Bacup carry on turkey-red dyeing. Chair-making is a specialty of the beech-growing districts of the Chiltern Hills, where the industry employs about 50,000 families. The making of the different parts of chairs (seats in one district where the larger trees grow, and legs and the smaller parts where only small trees grow) is carried on domestically, the parts being merely put together in the towns (chiefly High Wycombe). Sugar-refining is carried on principally at three seaports—London, Liverpool, and Greenock.

755. The making of shoes is the leading industry in Northampton, is among those of Leicester and Stafford, and is carried on to a greater or less extent in nearly all the large towns of the country, for the fact that they are costly to transport on account of their bulk as compared with the raw material, makes it economic to manufacture them wherever the demand is exceptionally large. Gloves are made at a great many small towns in agricultural districts, where labour is cheap, as at Worcester, Hereford, Woodstock in Oxfordshire, Taunton and Yeovil in Somersetshire, Great Torrington in Devonshire, Chester, &c. The making of hand-made lace is an industry in a similar position, still pursued at Honiton in south Devon, where it has been practised since the time of Charles I., in the vale of Aylesbury in Bucks and elsewhere.

756. Seaports. On the average of the periods 1884–88,[1] the ten

[1] In 1908–12 the order was London, Liverpool, Hull, Manchester, Harwich, Southampton, Bristol, Glasgow, Leith, Grimsby, importing in the aggregate 83 per cent. of the total value.

following seaports—London, Liverpool, Hull, Glasgow, Folkestone, Leith, Newhaven, Bristol, Newcastle, and Southampton—received nearly 84 per cent. of the total value of the imports of the United Kingdom. The first four of the seaports just named are also first in the value of their exports, Liverpool, however, ranking under this head before London. Next to these four in order of the value of their exports are Grimsby, Southampton, Harwich, Goole, Cardiff, and Newcastle; and these six seaports, together with the first four, despatched on the average of the same period nearly 90 per cent. of the exports.[1]

757. First in rank among the British seaports still stands London,[2] as it always has done, having received during the period mentioned $35\frac{1}{2}$ per cent. of the imports in value and despatched 30 per cent. of the exports.[3] The situation at the head of ocean navigation on a river which allows ocean vessels to ascend far into the interior of the Kingdom, and which has its mouth directly opposite another great estuary—that of the Scheldt—and nearly opposite the mouth of the Rhine, gives it a commanding position for continental trade. It is these two circumstances which determined its early growth, and hence indirectly made it the capital of the country, a position which favoured its further increase in population and wealth more and more as the British Empire extended. It thus became ultimately the greatest import market in the world, a fact which of necessity greatly promoted its *entrepôt* and transhipment trade, especially since so much of that trade, on the export side, is carried on with the neighbouring continental countries. More than 50 per cent. of that characteristic trade of the United Kingdom is carried on at this port. The enormous local market, together with the facilities for redistribution both by land and sea, are no doubt the circumstances that have made London the one great port, not only for such Eastern products as tea and spices, but also for coffee and cocoa, and it is no doubt the latter circumstance—the ease of redistribution, as well as collection—that has been the determining factor in making London the chief centre for Australian trade. So much colonial wool is still sold in London that just before the war an experiment was made in grading and marketing British wool there also—with profit, it is said, to the farmers. Of late years increasing difficulty has been felt in meeting the requirements of the enormous shipping of this port, and the complaints of shippers led in 1908 to the passing of an act placing the whole port, defined as extending from the tidal limit of the river at Teddington Lock to a line joining Havengore Creek in Essex to Warden Point in the Isle of Sheppey

[1] In 1908–12 the order was Liverpool, London, Glasgow, Hull, Manchester, Grimsby, Southampton, Cardiff, Tyne Ports, Goole, exporting in the aggregate 85 per cent. of the total value.

[2] Population, County and City of London, upwards of 4,500,000; of 'Greater London'—that is, of the London Police Districts—upwards of 7,500,000.

[3] In 1909–13, 33 per cent. of the imports, 25 per cent. of the exports (19 per cent. of those of British and Irish origin).

(and thus including, as at present, Queenborough), under the control of a single authority known as the Port of London Authority, which has acquired not only all the docks of importance, but also the warehouses belonging to them.[1]

758. Liverpool[2] has risen to a high rank among the seaports of the world only within the last two hundred years. Early in the eighteenth century it was a small place ; its chief trade was with Ireland, and in that trade it had rivals in Preston and Chester, which were equally well suited for the small ships then in use. Its importance rose with the development of the cotton, woollen, and other manufactures of its hinderland, which may be said to include the whole of the industrial area from the Ribble to the north of Warwickshire and even for the bulk of oceanic traffic that lying to the east of the Pennine Chain in the West Riding of Yorkshire. The inadequacy of the ports at the mouths of the Ribble, Dee, and even the Severn, prevents them from offering in the meantime any serious rivalry. Since 1894, however, its hinderland has been encroached on by the port of Manchester, some effects of whose rivalry are shown in a note to par. 726. Though the Mersey, as a mere harbour, is capacious enough to admit all the fleets of the world, the building of docks and quays has been necessary for commerce, and the six or seven miles of continuous docks on the Liverpool side of the Mersey present a sight unparalleled elsewhere.[3] The port of Liverpool includes the docks on the Cheshire side of the Mersey at Birkenhead, as well as the Garston docks on the Lancashire side, belonging to the London and North-Western Railway Company, whose train marshalling sidings are a special feature. Except these last docks, the port is under the control of the Mersey Docks and Harbour Board, constituted in 1857. A sandbank at the mouth of the Mersey, which formerly prevented the entrance of large vessels at low tide, has been dredged so as to allow of large modern liners entering or leaving the port at dead low water.

759. Hull, lying as it does on the east or continental side of the island, is one of the older ports of England, though its antiquity does not reach back to Roman times. It is said to have been founded by King Edward I., who here built a town, which was called King's

[1] This authority is providing for the establishment and maintenance of a 14-feet channel at low water up to London Bridge, and one of 30 feet in depth with a minimum width of 600 feet up to the Albert Docks opposite Woolwich. The Tilbury Docks, opened in 1886, are the deepest docks of the port, 38 feet ; and they have $54\frac{1}{2}$ acres of water-space, with 5,230 yards of quayage. Both here and at the Albert Docks great extensions have been decided on, and the enlarged main dock at Tilbury is to have a depth of 48 feet.

[2] Population, including Bootle, upwards of 900,000, and including Birkenhead-Wallasey, which since the completion of the tunnel under the Mersey may be fairly regarded as forming geographically part of Liverpool, above 1,100,000 ; and even this does not include some large urban areas lying just outside the municipal boundary of Liverpool.

[3] A proposal has been made to transform Mann Island into a fish depôt.

Hull 250,000

town. Hence the full name of the town, Kingston-upon-Hull, Hull being properly the name of a small river which enters the Humber at the place where the town stands. It still retains a large trade in fish, which had 'strangely enriched the town' in Camden's time, but this commodity is now greatly exceeded by many other items in its very varied commerce. It has a large trade in oil-seeds and extensive manufactures arising out of that trade, a trade favoured by the large adjacent markets for the oil-cake on the one hand, in the agricultural districts, and the oils and oil products in the West Riding and other industrial districts. Its chief connections are with the continent of Europe, and especially with Hamburg and Bremen. Grimsby, on the Lincolnshire coast, has a similar trade, which has recently been growing even more rapidly than that of Hull, especially on the export side. It is one of the few ports in this country the value of whose exports exceeds that of the imports. The port, whose docks and quays belong to the Great Central Railway, includes the Immingham dock[1] adjoining on the north, which has been specially equipped for the export of coal. The special advantages of Grimsby for the inland fish trade have already been referred to (**502**). Goole, the third of the Humber ports, owes its importance chiefly to the shipment of coal brought by the Aire and Calder navigation (**659**).

760. Glasgow, now the fifth port in the kingdom in respect of the total value of its imports and exports, has had a history in many respects similar to that of Liverpool. It has risen into importance only with the development of the New World and modern manufacturing industry, and the accommodation that it affords for mercantile shipping has had to be provided artificially to even a greater extent than in the Mersey. Its first lucrative trans-oceanic trade was with the southern 'plantations' of North America and the West Indies, whence tobacco and sugar, then much more valuable commodities than they are now, were imported. The trade began as a smuggling trade even before the union of the English and Scottish parliaments, but so flourished afterwards that Glasgow beat all its English rivals in the tobacco trade, for the tobacco, brought from the plantations under the regulations then in force first to this country, but being mostly exported to the continent, had a shorter land transport, even from Irvine, which was then the port of Glasgow, to an eastern port (Bo'ness), than could be found at any other port in Great Britain. The Clyde, however, was then but a small river. Little more than a hundred years ago it was still fordable twelve miles below Glasgow. Then came the modern inventions which made coal and iron so all-important, and the fact that these minerals are found together in the immediate vicinity of Glasgow made it worth while to convert the river into 'a

[1] With a depth of from 30 to 35 feet.

Glasgow and Clydebank . . . 1,100,000

channel of the sea, bearing on its waters the ships of all nations, and of the deepest draught.'[1] Glasgow, at the same time, is a great manufacturing town, but the industries carried on there are so varied that none can be singled out as specially characteristic, except the shipbuilding of the Clyde and marine engineering. As the western outlet of one of the chief manufacturing districts of Great Britain its export trade is very large, and Glasgow is indeed singular among the great ports of the country in having an export trade of twice the value of its import trade. The reason is that many of the most valuable of the imports of the Glasgow district come from the continent and enter the country by the eastern ports of Leith and Grangemouth, which latter has supplanted Bo'ness since its foundation on the mud-bank chosen for the eastern terminus of the Forth and Clyde Canal. Greenock, the only other port of any consequence on the Clyde, has a comparatively small export trade, and the only commodities imported by it in great quantity are raw sugar, which is refined in the town, and iron ore.

761. Southampton, the chief commercial port on the south coast, is one whose commerce and shipping, like those of the other southern ports, reach back to an early date. A Roman station existed on the small tongue of land between the Itchen and Test, on which the town is situated. In 1891 its docks, which now afford accommodation alongside of the quay walls for the largest ships yet built, were acquired by the London and South-Western Railway Company, and since then, according to the statement in the Report of the Royal Commission on the Port of London, its shipping has increased at a more rapid rate than that of any other leading British port. Its position, together with its ample accommodation and easy entrance, makes it a convenient calling place for continental liners, a trade likely to develop considerably in the future. It is the only port, besides London, on the south or south-east of England that has an export trade exceeding 2 per cent. of the total value of the export trade of the United Kingdom, its trade under this head being fairly representative of British export trade generally. An important feature of its import trade is the reception of large quantities of fresh and refrigerated meat (**719**). It has also a large passenger traffic, especially with the West Indies, South America, and Africa. With Southampton may be contrasted Harwich, Dover, Folkestone, and Newhaven, all packet-stations in connection with different railway companies, and all having a large import trade very similar in character, but a relatively small export trade. The imports are largely made up of perishable articles, such as butter, eggs, fresh meat, poultry, fish, fruit, and of manufactured articles of relatively high value in proportion to their bulk, such as silks, woollens,

[1] The docks on the lower harbour have a depth of from 27 to 40 feet at high water spring tides.

Greenock . . .	75,000	Southampton . .	150,000

gloves, watches, and parts of watches. Silks make up more than half the value of the imports at Folkestone, nearly 30 per cent. of those of Newhaven. Folkestone and Dover together admit all but a small fraction of the watches and parts thereof imported into this country. A large import of cotton manufactures at Harwich is no doubt accounted for by the fact that Swiss embroideries take this route into England. Bristol is the only western seaport noted in the early commerce of England (**764**). Owing to the shallowness of the upper part of the estuary of the Severn, it served as an outlet not only for the populous region immediately to the east of it, but also for the Severn valley, and after the settlement of the New World it was one of the first seaports to secure a large share of the trade in tobacco and sugar. At the present day its import trade continues large, but its exports are comparatively insignificant. Its development has been retarded by the inadequacy of the Avon to meet the requirements of large modern ships. The corporation of the city of Bristol has, however, constructed large deep-water docks on both sides of the mouth of the Avon, that is at Avonmouth and Portishead, both included in the port of Bristol. Considering the position of the port one might expect that, with sufficient shipping accommodation, it ought to carry on not merely a large passenger traffic, but to serve, in a large measure, as the port for the southern midlands.[1] As to Cardiff, see par. **749.**

762. Edinburgh has the advantage of having two seaports within its extended boundaries of 1920—Leith and Granton. Leith has an import trade in many respects similar to that of Hull, but serves (along with Grangemouth) in an even higher ratio than Hull as an inlet for sugar, butter, cheese, eggs, and other continental produce destined for the populous districts in the west. The exports are comparatively small—larger, however, than at Bristol, seeing that some of the products of the west come here for export to the continent. Granton is a less busy port with smaller port dues, presenting accordingly advantages for ships laden wholly with one bulky commodity, but ill suited for large vessels with mixed cargoes, inasmuch as it has not the same facilities as Leith for distribution. The fisheries of Aberdeen are mentioned elsewhere (**502-3**).

763. The direct foreign trade of all Irish ports is small, and especially under the head of exports. Dublin, Belfast, Cork, Waterford, Limerick, and Londonderry all import directly considerable quantities of wheat and maize ; Belfast also of flax ; but no Irish port has exports of native origin to foreign countries amounting to one million sterling in value. Even the linens of Belfast are sent to the United States and elsewhere mainly by way of Liverpool and Glasgow. On the other

[1] In 1913 much less than 1 per cent. of the total value of the exports of the United Kingdom.

Bristol	375,000	Dublin	300,000
Edinburgh	420,000	Belfast	400,000
Aberdeen	160,000		

hand, the Irish ports [1] carry on a large trade with Liverpool, Glasgow, Fleetwood, Milford Haven, and other British ports, to which they send cattle, swine, butter, and other native produce, and whence they receive British and foreign commodities.

764. In early times and throughout the middle ages the great feature of English trade was the export of raw materials and the import of manufactured articles. By far the most important of the exported raw materials was wool, but it was only one of several, the export duties levied on which furnished a large part of the revenue of the crown. With the obvious intention of facilitating the collection of this revenue the regulation of this trade was attempted in the reign of Edward I., and the trade was more definitely organised by an ordinance of Edward III. in 1353. Therein the only staple commodities enumerated are wool, wool-fells (that is, sheep-skins with the wool on), leather or hides, and tin, but on other occasions lead, cheese, butter, alum, tallow, and worsted are also mentioned—the last, however, very seldom. The ordinance decreed that all these commodities should when exported be taken exclusively to certain English, Welsh, and Irish ports, where the duties were collected. The English ports included all those of any consideration on the east coast except Berwick-upon-Tweed, also Southampton and Exeter on the south coast, and Bristol on the west. The reasons for the exception of Berwick-upon-Tweed from the list of English ports probably was that if it had been included under the regulations of the staple, English wool would have been smuggled across the Scottish border and exported from some Scottish port. Sometimes Newcastle also was omitted from the staple towns. Carmarthen was the sole staple port for Wales. In Ireland there were four: Dublin, Waterford, Cork, and Drogheda. No external staple port was mentioned, although there had been a staple abroad at various ports in the Low Countries at previous dates, and subsequently it was again found convenient to fix upon some external port as the one place beyond the seas to which all staple commodities should first be sent. From near the end of the fourteenth century till 1558 Calais was the sole external staple, but when the English lost Calais in that year the staple was transferred to Bruges. The trade in the staple commodities was mainly, but for one reason or another not at all times solely, in the hands of a privileged body known as the Staplers, who had a court of their own at Calais. The Staplers were mostly foreigners, and indeed several ordinances, including that of 1353, absolutely prohibited the trade in staple commodities to Englishmen, these being liable to smaller dues than foreigners. The loss that the revenue thereby incurred was one that the kings could not always afford, and one that was occasionally more than made good by the granting

[1] To relieve congestion at Dublin and Belfast, harbour-dredging schemes are being carried out, extensions undertaken, and up-to-date loading and unloading machinery introduced.

of special licences to Englishmen to engage in the staple trade even when there was a general prohibition. Such licences were of course obtained only on conditions that were advantageous to the crown. Among the foreigners engaged in the staple trade of England were many Italians, but members of the Hanseatic League (**853**) were still more conspicuous. The merchants belonging to this league had gained special privileges in the foreign trade of England before the close of the thirteenth century. In what was known as the Steelyard in London on the Thames,[1] they had a well-protected residence with warehouses, and they had similar residences at some other English ports. Their privileges were for the most part maintained till 1598, when they were finally withdrawn by Queen Elizabeth.

765. Long before this, however, the trade of native English merchants had been growing through the efforts of an organised company known as the Merchant Adventurers. The name of 'adventurers' was given to those who traded in commodities not embraced by the regulations of the staple. English grain and honey could thus be freely exported to Norway and other parts in which such commodities found a market; but as English manufactures grew (**331-2**) these became the most valuable commodities outside of the staple. Woollens accordingly came to be the chief wares whose sale abroad was pushed by the adventurers. When this body became a regularly organised society is uncertain, but in 1404 a charter was conferred upon it by Henry IV., and shortly after the company was enabled to establish its headquarters at Antwerp. Other charters were subsequently conferred upon it, and it grew to be an extremely influential body in the sixteenth and seventeenth centuries. Its headquarters were ultimately transferred to Hamburg, on which account it became known as the Hamburgh Company, but though its chief seat was thus abroad the membership was absolutely restricted to Englishmen. In later days its special domain was all that part of the North Sea coast which lies between the Straits of Dover and the north of Denmark. It became, however, the parent or the model of several other merchant companies, which claimed, if they did not always enjoy, monopolies of trade elsewhere. Sebastian Cabot, who with his father John Cabot had made the first voyage from England to America in the search for a north-west passage to India in 1497, lived long enough to suggest to the Merchant Adventurers in the middle of the following century a voyage in search of a north-east passage to the same destination. The voyage was actually made in 1553 under Willoughby and Chancellor and led to the discovery of a route to the White Sea and the mouth of the Northern Dvina. In the same year a company known as the Muscovy Company received a charter conferring upon it privileges in the trade with Russia and Persia. In 1579 the Eastland Company obtained its first charter conferring privileges in connection

[1] The site is now partly occupied by Cannon Street Station.

with Scandinavian and Baltic trade. Afterwards the Levant or Turkey, the East India, and the Africa or Guinea Companies, as well as the Hudson Bay Company (**487**), were successively founded. The most important of these for the future of England was of course the East India Company, which obtained its first charter on the last day of 1600, and subsequently to the implicit annulment in the Declaration of Rights in 1689 of all royal monopolies of trade, had a monopoly of the eastern trade expressly conferred upon it by Parliament. This monopoly was retained for India till 1813 and for China till 1833. By this date the Company had become a great territorial power, and from 1833 it was nothing else.

766. Meanwhile the nature of English trade had completely changed. English manufactures had long been the principal exports. Throughout the eighteenth century woollens were the most important of these, and so jealously was any rivalry in this trade regarded that every effort was made to check the rise of a similar industry in Ireland. In the course of the eighteenth century cotton goods came to acquire more importance. They were among the goods which Bristol and other merchants carried from England to West Africa to be exchanged for slaves sold in the West Indies, whence the ships returned home with cargoes of sugar and other tropical produce, a highly lucrative trade not put an end to till the first of January 1808, when the slave trade was made illegal. At last came the revolution in industry which created a new era not merely for English commerce but for the commerce of the world, and which in England speedily had the effect of raising cotton manufactures to the first place among our exports.

767. In recent times the practice of conferring royal charters on trading companies has been revived. Between 1880 and 1890 such charters were granted to the British North Borneo Company, the British South Africa Company, the Royal Niger Company and the Imperial British East Africa Company, and the first two of these charters are still in force.

FRANCE

768. The area of France, including Corsica, is about seven-tenths larger than that of the British Isles, the population somewhat smaller. The density of population is thus less in France than in the British Isles, but in France the population is more equally distributed.

769. Surface. The greater part of the mainland of France is made up of plains, gently rolling land, or broken hilly country offering little hindrance to communication. Lofty mountains, the Pyrenees **(941)** and the Alps, form the land frontier on the south and south-east. As yet the sole railway from France across the Alps is that which connects the valleys of the Isère and the Dora Riparia by means of the earliest of the longer Alpine tunnels, the so-called Mont Cenis tunnel, opened in September 1871. Even the French Jura and the Vosges, on the eastern frontier, are much higher than any British mountains, and obstruct to a considerable extent the communication with the adjoining countries.[1] (See the railway map of Italy between pp. 396 and 397). But the chief highlands within the French frontier are those of the so-called Central Plateau, which is really situated more to the south-east. These highlands have an average height of from 2,500 to 3,000 feet. On the east they are bordered by the Cevennes, which sink abruptly down to the Rhone valley; farther west they are crowned by the remains of the old volcanoes (the *puys*) of Auvergne; and they are traversed by profound river valleys opening to the north and west. The climate of the surface is bleak and the soil unproductive, but this is to some extent compensated by the richness of some of the valleys. This is particularly the case with the expansion of the valley of the Allier called the Limagne (round Clermont), which the volcanic dust **(83)** blown hither by the prevailing south-west winds from the mountains

[1] At present the only railways connecting Alsace with the rest of France pass respectively north and south of the Vosges proper, but since the reannexation of Alsace projects for railways through or across the Vosges, which had long been discussed, have gained more serious attention, and in March 1920 a law was passed providing for preliminary works on railways (1) to connect St. Dié on the west side of the Vosges with Saales in the valley of the Bruche on the east side; and (2) to connect St. Maurice on the west with Wesserling on the east. The first would shorten the distance from Strasbourg to Epinal by 18½ miles, to St. Dié by 49 miles, and would be easy of construction, making use of a pass only 1,830 feet high, but at the expense of gradients of 1·15 per cent. The second would shorten the distance between Mulhouse and Nancy by 143 miles, but involves the piercing of a tunnel more than 5 miles long.

of Auvergne has helped to make one of the most fertile tracts of France. Altogether, the Central Plateau is a sparsely peopled region, but even its most thinly peopled districts are to be compared rather with the less populous parts of Wales and the north of England than with the highlands of Scotland.

770. The level tract between the Adour and the Garonne on the south-east, embracing the maritime downs of the Landes, contains even less fertile land than the Central Plateau, and here also population is scanty and railways are wide apart. Corsica is highly mountainous, and, like other mountainous islands, has its population chiefly on the coast.

771. Internal navigation. The rivers of France are much more important as means of internal communication than those of England. Even the shortest of its great rivers, the Dordogne, is rather longer than the Shannon, and the Seine (with its tributaries, the Oise, Marne, Aube, and Yonne), the Loire, Dordogne, and Garonne, and the Saône, the chief tributary of the Rhone, as well as minor rivers, flow through plains and valleys presenting few obstructions to navigation for the greater part of their course. The impetuous Rhone, though navigable from Lyons, has its course impeded by sandbanks and other obstructions. Though Art. 358 of the Treaty of Versailles gives to France large powers over the waters of the Rhine where it now forms part of the French frontier, as the great bulk of the population on the immediate banks of the river is still German, the navigation of that river is more appropriately considered under Germany. The importance of the navigation naturally afforded by the rivers is shown by the canal connections between the rivers in the east and west. The Marne and Rhine Canal,[1] which crosses the northern end of the Vosges at the height of about 1,100 feet, and unites the Rhine navigation to that of the Seine, begins at a point on the Marne about 300 miles above the mouth of the Seine. A branch running north connects it with the Saar navigation, and so with the Saar coalfield. The Burgundy Canal,[2] which connects the navigation of the Seine and Rhone by means of the Yonne and Saône, begins on the former river at a point about 275 miles above the mouth of the Seine, and ends on the latter rather more than 300 miles above the mouth of the Rhone. It crosses the Côte d'Or at the height of 1,230 feet, and passes Dijon. The Canal du Centre[3] connects the Loire, about 400 miles from its mouth, with a lower point on the Saône, passing to the north of the Central Plateau at a height of about 1,000 feet at the summit. The Rhone and Rhine Canal[4] quits the Saône near the point of entrance of the Burgundy Canal, and enters the Rhine valley through the opening known as the Burgundy Gate, between the southern end of the Vosges and the western slopes of the Jura. The Canal du Midi[5] connects the Garonne

[1] 180 locks. [2] 191 locks [3] 84 locks.
[4] 157 locks. [5] 99 locks.

at Toulouse with the Mediterranean at Cette, traversing at the height of 625 feet the Passage of Naurouse or Gap of Carcassonne, between the Central Plateau and the Pyrenees. (See **792.**)

772. The Marseilles-Rhone Canal, 10 feet deep, opened May 7, 1916, passes through a tunnel more than $4\frac{1}{2}$ miles long. The accompanying map shows the inland waterways of France as distinguished by the law of 1879, those of the first class having a minimum depth of $6\frac{1}{2}$ feet, and locks of at least 126 feet in length and 17 feet in width. It makes clear the importance of Paris[1] as a water-traffic centre, and that of the northern district, where the flatness of the country favoured canal construction and where there is a large amount of heavy traffic connected with the Belgian system. It shows also the rivalry that must exist between the French port of Dunkirk and the Belgian port of Antwerp in connection with that traffic. All the north of France east of 4° E. is in fact nearer Antwerp than Dunkirk by water. Inland water traffic is chiefly local, but raw cotton is now conveyed from Havre by water to the cotton-working region of the Vosges, and coal from the north is beginning to find its way by water to Lyons.

773. In 1912 a National Office for Internal Navigation was established with the view of developing inland water traffic in every way.[2]

774. A project for the construction of a canal from Strasbourg to Basel, designed to afford water-power at the locks, is causing much uneasiness in Switzerland on account of the great withdrawal of water from the Rhine which the carrying out of the project would entail.

775. As regards **climate** France has all the advantages of a westerly maritime situation, together with a more southerly latitude than the British Isles, and it is therefore to be expected that France should excel this country, as it does, in respect of the abundance and value of its agricultural products. The greatest contrasts of climate within a short distance are those between the south-west with its prevalent north-westerly winds of summer, bringing copious summer rains favouring the growth of maize, and the south-east with its typical dry Mediterranean summers, utterly unsuited for maize, but favourable to wine and fruit, as well as wheat. The south-east is exposed especially in winter to the violent cold northerly wind known as the mistral.

776. Less than one-fifth of the surface of the country is occupied by mountains, about a fourth by plateaux. This leaves more than one-half for the lowlands, which, it is true, are not everywhere fertile (**770**), but nevertheless contain a large proportion of fertile soil. Though

[1] It is estimated that not much less than half the quantity of goods brought into Paris come by water, which handles nearly one-third of all the traffic (in 1909 about $35\frac{1}{2}$ million tons) carried on French waterways.

[2] One of the projects most keenly urged at present is the construction of a canal south-eastwards across the gap in the north between Valenciennes on the Escaut and Mézières on the Meuse, a little below Sedan. At present the upper Meuse (with the Briey basin, **780**) is rather more than 70 miles nearer Antwerp than Dunkirk by water, but this canal would make the French port rather the nearer of the two.

the ratio of the total surface of France to that of the British Isles is only 1·7 : 1, the extent of corn-crops in France has in recent years been

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more than $3\frac{1}{2}$ times as great as in the United Kingdom. Not many years ago the wheat-crop of France was next in amount to that of the United

States among all the countries of the world for which statistics are obtainable, but before the war it was surpassed by that of Russia. On the average of the ten years 1877–87 it was estimated to form nearly one-fourth of the wheat-crop of Europe.[1] And in addition to wheat and other British crops France produces large quantities of maize (in the south-west), besides the less valuable rye and buckwheat, principally on the poorer soils of Brittany and the Central Plateau.

777. Besides corn-crops France produces all the ordinary British green-crops, potatoes and mangold each covering more than twice as great an area as in the British Isles; the vine, the most valuable of all the French crops **(296)**, still covers, notwithstanding the devastations of the phylloxera, an area as large as that occupied by wheat and barley together in the United Kingdom; the average of sugar-beet greatly exceeds the British average of mangold; and large areas are occupied by olive-yards, mulberries, for the rearing of silkworms, colza, hemp, and flax, though the last-mentioned crop is smaller than that of Ireland. Tobacco is likewise a product of no little importance, though the total acreage occupied by it is less than half of that devoted to hops in England.

778. While the area under wheat in France is about nine times as great as that in the United Kingdom, the yield is far from being proportionately great; but in making such a comparison it should be borne in mind that the French grow wheat for their own consumption all over the country, while in the United Kingdom it is confined to the areas most favourable to its production in respect of soil, climate, and situation with reference to markets and foreign competition. Irrespective of high protective duties much of the wheat-growing land of France is naturally protected by the long railway transport necessary to reach the local markets. In these circumstances as high a yield per acre is not to be expected in France as in Great Britain. A steady improvement in French agriculture is, however, shown by the fact that in every decennial period from 1821–30, when the average yield of wheat per acre was $13\frac{1}{4}$ bushels, there has been a rise in the average down to 1881–85, when it amounted to 18 bushels, and again in 1901–10, when it amounted to 20 bushels **(242)**.

779. The leading French fisheries are mentioned elsewhere **(505)**, but it may be mentioned here that under a law passed in June 1920 extensive government subsidies are given for the development of the deep sea fisheries.

780. The **mineral wealth** of France is of growing importance. The coalfields, though small, and not very productive, are, however, scattered over different parts of the country, and the central region—that, accordingly, which is farthest from supplies of sea-borne coal—has the greatest number of centres of local supply. The most productive

[1] Still true about 1900. See *Agric. Returns, U.K.*

coalfield is a continuation of that of Belgium, and the chief centres of production are Lens and Anzin (see map, p. 390). Next in productiveness are those on or near the eastern side of the highlands which border the basins of the Rhone and Saône on the west—round St. Etienne in the middle, round Creuzot farther north, and at Alais in the south.[1] By the Treaty of Versailles the coal deposits of the Saar basin become the property of the French state, and at the end of fifteen years the inhabitants of the basin are 'to indicate the sovereignty under which they desire to be placed.' It is in the production of **iron ore** that France has shown a remarkable increase. The principal producing district has long been in the north-east in the basin of the Moselle, near Nancy and Longwy, but the most productive part of that district, with **Briey** as its centre, was unknown till the eighties of last century, and various difficulties retarded their development for some time after they became known. It is said that when the deposits expected to prove the easiest of all to work are opened up it will be possible to make pig-iron here cheaper than anywhere else in Europe, though it is necessary to obtain coke either from Germany or Belgium. The ores are basic ores containing from 36 to 40 per cent. of iron and from 8 to 16 per cent. of lime, of the same character in fact as the ores of the neighbouring deposits which were retransferred from Germany to France at the Treaty of Versailles. As these last ores were of peculiar importance in the economic development of the late German Empire they are more appropriately dealt with in the meantime at least under that head (**832**). Other deposits have long been worked round Creuzot, and more important deposits have more recently been opened up in the west, especially in Normandy, near Caen. There is a considerable and increasing production of Bessemer ores in the eastern Pyrenees, on the north-west and south-east slopes of Canigori. The potash deposits of Alsace, a little to the north-west of Mulhouse, are next in importance to those of Prussian Saxony. Sea-salt is obtained from salt-pans on the western Mediterranean coasts and on the coasts of the Bay of Biscay ; rock-salt, near Nancy, in the north-east.

781. Since about the end of last century much has been done to develop what the French call 'white coal,' that is, water-power,[2] which is furnished in great abundance especially by the Alpine torrents.

[1] In 1913 the consumption of coal in France was about 63 million tons (about $1\frac{1}{2}$ tons per head), of which about one-third was imported, chiefly from Great Britain and Belgium.

[2] Great schemes are now (1921) under consideration for holding up the water of the Rhone where it enters France, one involving the erection of a dam which would maintain the level of the water about 230 feet above the river below. In 1908 the streams of France were estimated to be able to supply a minimum of 4·6 and an average of 9·2 millions of horse-power. An experiment in the development of tidal power is about to be made (1921) by building a dam across the narrow mouth of the estuary of the Aber-Vrach in the north-west of Brittany. On French water-power see articles in the *Annales de Géographie*, 1904, and *La Géographie*, 1913.

The most important installations so far are in the neighbourhood of Grenoble on the Isère, Romanche, and Drac.

782. One consequence of the wide dispersal of the French coalfields is the fact that the localisation of the great French **manufacturing industries** is governed more by the position of local supplies of raw material and the conveniences for obtaining supplies from abroad and marketing the product than by the supply of fuel.

783. The earliest centre of the iron industry is Creuzot, which, while the industry was still small, was favourably situated in respect of all the bulky raw materials. It is still noted for the making of machinery, locomotives, and other railway material, as well as other important branches of the iron and steel manufacture, but such industries are also largely carried on at Paris, Lille and other large towns. Since the development of the Briey basin a great iron industry has grown up there, and blast furnaces and steel works have also been erected near Caen. An important feature of the industry in recent years in the south-east has been the application of water-power in electric furnaces for the production of the finer kinds of steel.

784. Paris, the capital of the country, is, like London, too large to be specially identified with any particular industry, but is the seat of a large number, more particularly those concerned in the production of articles of luxury, such as are in greatest demand in a large capital. Jewellery and perfumery, furniture, porcelain, glove-making and the making of fashionable boots and shoes, and a great variety of fancy ware, are all notable Parisian trades. The celebrated porcelain work which gave name to Sèvres porcelain is now carried on at St. Cloud, immediately to the north of Sèvres, on the left bank of the Seine, to the west of Paris proper. The central position of Paris in the great northern plain of France, just below the junction of the Marne and Seine (**772**), has been in favour of its acquiring and retaining the rank of capital, and the fact of its being the capital and centrally situated makes it without a rival in the country in trade and population.

785. The woollen industry is chiefly carried on in the north, where there are the principal supplies of native wool, and where supplies of foreign wool are most easily obtained from the River Plate and from England, where also, in addition to easily accessible coal supplies, the seats of the industry are intermediate between two of the most important markets for woollens in the world, London and Paris—both, for this centre, free-trade markets. The principal markets for wool in France in the order of importance are Roubaix, Tourcoing, Fourmies, Reims, and Amiens. Roubaix, Tourcoing, and Fourmies are all close to the northern frontier and are most directly supplied by way of Dunkirk; Reims lies beside the sheep-pastures of Champagne, a region similar to the English downs, which has fostered a trade in wool

For population of towns under 200,000 see p. 367.

Paris . . . . . . 2,900,000.

and woollen-manufactures at Reims from a very early period. Amiens, on the Somme, is almost equally accessible from the ports of Havre and Rouen in the south and Dunkirk in the north. All these towns are also noted for their woollen manufactures, those of the closely adjoining towns of Roubaix, Croix, and Tourcoing [1] including carpets. Sedan on the Meuse, in the north-east, is another old manufacturing town engaged in the same industry, fostered by the sheep-pastures of Ardennes. Elbeuf, on the Seine above Rouen, and Louviers, a little to the south-east, are noted for their woollen (as distinguished from worsted) cloths ; and Troyes, on the upper Seine, has long been noted as the chief seat of French hosiery.

The advantages for textile manufactures in the extreme north are not confined to woollens, and Lille, the largest manufacturing town of this district, has linen, cotton, as well as woollen, and other textile industries, the first-mentioned branch being favoured by the fact that the part of France to which it belongs produces excellent flax. To the south-east of Lille, on the Escaut, stands Cambrai, which gives name to cambric.

786. The silk-manufactures still have their chief seats in the valley of the Rhone, where they first grew up in consequence of the introduction of the silkworm (**347**). Lyons (*Lyon*), the third town in France in point of population, the birthplace of the inventor of the Jacquard loom, is the town whose name is most intimately associated with this industry in all its branches. It lies at the confluence of the Saône and Rhone, partly on the left bank of the latter river, partly on a small alluvial flat between the two, and immediately overlooked by the hills which skirt the right bank of the Saône. Next in importance to Lyons in connection with this industry is St. Etienne, which supplies Lyons with coal. St. Etienne manufactures chiefly ribbons. Both it and Lyons have excellent water for dyeing. Avignon, on the Rhone below Lyons, and Nîmes and other towns in the valley are also engaged in the silk industry, which likewise employs large numbers in Paris.

787. In the cotton industry the restoration of Alsace to France has given this part of the country once more the leading place. Textile manufactures as a domestic industry had long been carried on in the hamlets of the Vosges valleys, and these supplied much of the labour required under modern conditions. Calico printing was started at Mulhouse [2] as early as 1746, and this led to the establishment of cotton spinning and weaving in which steam power began to be used in 1812. Colmar, Guebviller, and other places in the neighbourhood, where power afforded by the torrents of the Vosges can be used to supplement

[1] Aggregate population of the three towns, about 220,000.

[2] In 1913 Mulhouse alone had nearly 600,000 cotton spindles—among the largest on the continent (compare the Oldham district with nearly 19,000,000).

Lille	220,000	Lyons	525,000

steam, are also engaged in the industry. After the transference of Alsace to Germany in 1871, cotton factories were established at Sénones, St. Dié, Epinal, and other places west of the Vosges; but outside of Alsace the cotton manufacturing towns of Normandy, and above all Rouen, are pre-eminent. Further north the chief cotton-market is St. Quentin, to the south of Cambrai. Another important centre is Roanne on the Loire.

788. Limoges, on the Vienne, is noted for its porcelain and earthenware. Both coal and kaolin (**590**) are obtainable at no great distance, though they lie in different directions from the town. Glass is made on or near the coalfields of the north and centre, generally in the immediate vicinity of fine sand; paper at Angoulême in the west, and Annonay in the east; watches at Besançon in the Jura, though the chief industry of this last town consists mainly in putting together parts of watches made in the Swiss Jura. The manufacture of kid gloves is carried on in nearly every village within a radius of forty miles of Grenoble in the Alpine valley of the Isère. Strasbourg carries on a variety of manufactures, but at present is chiefly important as an administrative and commercial centre, although the completion in 1907 of the works designed to make it a great river port may be expected to stimulate its industrial activity,[1] notwithstanding the barrier placed between it and its most accessible large market by the change of frontier made in 1919.

789. The principal French **seaports** in the order of their importance are Marseilles, Havre, Rouen, Dunkirk, Bordeaux, La Rochelle with its outport of La Pallice, Nantes with its outport of St. Nazaire, and Cherbourg. For general notes on the recent changes in the foreign commerce of France, see the table showing the exports since 1871–5.

790. The priority of Marseilles, distant as it is from the capital and the great northern seats of industry, is due to the fact of its being the only first-class port belonging to the Rhone valley. The Rhone delta itself is too marshy, the mouth of the Rhone too much encumbered by sandbanks, to have afforded a favourable situation for the rise of a port, and hence Marseilles was founded on the nearest place on the coast where nature had furnished the conditions which the delta of the Rhone denied. Ever since its foundation by a body of Greek colonists from Phocæa in Asia Minor, about 600 B.C., it has been a great seat of commerce and shipping. The Rhone valley, besides being itself rich and productive in various ways, affords access to the plains of northern France and Belgium through the valleys of the Loire and the Seine tributaries along the routes indicated by the position of the canals already named (**771**), to the Middle Rhine valley by the Burgundy Gate

[1] Quantity of coal received from the Ruhr basin at the port of Strasbourg in 1896, 211,000 metric tons, in 1912, 904,000; total traffic in 1913, close upon 2 million tons, in 1918, 1·17 million.

Marseilles . . . 550,000

between the Vosges and the Jura, to the tableland of Switzerland by way of Geneva through the narrower opening between the Jura and the Alps. The advantage of some of these connections has, however, been considerably reduced by the piercing of the Alps by railway tunnels; and especially by the construction of the St. Gothard tunnel, which gives to Genoa (972) a shorter route to Antwerp than that from Marseilles. Within France, however, there is no railway route on which the gross receipts per mile are so great as on that from Marseilles to Paris. (See also **629, 772.**)

791. The position of Marseilles causes its trade to be chiefly with the Mediterranean and the East, and this is one of the ports benefited by the opening of the Suez Canal (**1006**). Among its chief imports are wine from Italy and Spain, wheat, oil-seeds, sugar, coffee, pepper, and other Eastern products. Among its local industries may be mentioned particularly the refining of oil and the making of soap, stimulated by the local supplies of olives, and the import of olives from Italy and of various oil-seeds from India and the East generally, as well as from Africa. There is also a large manufacture of maccaroni from hard wheat imported from Italy. Marseilles is the headquarters of the great steamship company known as the *Messageries Maritimes*, which carries on an extensive commerce with the East and the Pacific.

792. Cette, on the west of the Gulf of Lions, has mainly a local importance through being the terminus of the Canal du Midi. At present Marseilles is without a rival on the Mediterranean, but it was not so in the Middle Ages, when ships were smaller and some French Mediterranean ports existed which are no longer accessible. Even then Marseilles ranked first, but the ships of Arles on the Rhone were to be seen side by side with those of Marseilles in the most distant parts of the Mediterranean. Narbonne continued to be an important port till the fourteenth century, but in 1320 a breach in the embankment of the Aude caused that river to leave the town, which the Robine branch of the Canal du Midi did not serve to restore. Aigues Mortes, in virtue of a canal connecting it with the sea, was once a great resort of maritime shipping, and lingered on as a seaport till Cette was fixed upon as the eastern terminus of the Canal du Midi, which was opened in 1681. Then the efforts to fight against the deposits of sand and silt ceaselessly brought by currents with a westerly set to the Languedoc coasts of the Mediterranean were abandoned, and Aigues Mortes was allowed to fall into decay. The port of Cette requires constant attention to preserve it from the same fate.

793. The commerce of France on the western and north-western coasts is in the aggregate much greater than that on the Mediterranean, but is divided among a greater number of large seaports. Havre, or Le Havre, at the mouth of the Seine, founded in 1509 by Louis XII., has grown to be 'the haven' of Paris since its harbour was extended and improved by his successor Francis I., and since the elder seaport

of Harfleur, a little higher up, declined through the silting up of its harbour. It is the chief seat of trade with America, and hence the chief place of import of North American cotton, tobacco, wheat, animal produce, &c., and of South American coffee, for which it is now the principal European *entrepôt*, a position which is favoured by the possession of a highly organised local market, though this again may be regarded as a natural growth at a port, which is at once the most favourably situated for supplying one of the largest consuming countries in Europe, and the first touched at on the routes to the other large markets farther north. Steps have been taken for large port installations linked with Havre at Harfleur on the south side of the estuary of the Seine. Since 1887 the Tancarville Canal has afforded direct communication between the port of Havre and the Seine, thus enabling smaller vessels to avoid the dangerous navigation of the estuary of the Seine.[1] Rouen has since the same date taken away some of the trade of Havre, the Seine having been deepened and straightened up to that port, where vessels drawing as much as 22 feet can lie afloat alongside parts of the quays.

794. In the north Havre has latterly been exposed to the keen rivalry of Dunkirk, the only French port on the North Sea, a port which in recent years has been the most rapidly rising of all French ports, in consequence of its being so favourably situated for the supply of the northern manufacturing towns with their imported raw materials (above all South American wool), and for the export of their manufactured products, including iron, beetroot-sugar, and oils. Its harbour can now accommodate vessels up to 600 feet in length with a draught of 30 feet.

795. Bordeaux, on the Garonne, a little above the place where the estuary of the Gironde is formed by the confluence of the Dordogne, has long been the chief place of export of French wines. For vessels of the largest class it has an outport in Pauillac, on the left bank of the Gironde (**163**), but at spring-tides vessels drawing as much as 24 feet can come up to Bordeaux itself, and at all times vessels of 20 feet draught. La Rochelle, as the outlet of the middle parts of western France, has acquired importance chiefly since the inauguration in 1891, about 3 miles to the west, of its outport of La Pallice with accommodation for large vessels. St. Nazaire, at the mouth of the Loire, like Pauillac, grew in importance through the introduction of large shipping, and also through the silting up of the Loire at Nantes. It is capable of accommodating ships of the largest size, but Nantes, after being almost closed to sea-going vessels, has been restored to the position of a considerable seaport by the construction of a ship canal admitting vessels up to a draught of 20 to 21 feet. Since then the

[1] A proposal to connect the port with Paris by a petroleum pipe-line has been adopted by the Ministry of Public Works.

Bordeaux . . . above 260,000

Loire below Nantes has been dredged, so increasing the scour of the river that large vessels can now go up to Nantes. Cherbourg, on the northern peninsula of Normandy, has obvious advantages as a calling place for continental steamers similar to those of Southampton.

796. The five naval stations of France are Cherbourg, on the English Channel, nearly opposite Portsmouth; Brest and Lorient, in Brittany; Rochefort, on the Bay of Biscay; and Toulon, on the Mediterranean. At all of these there are government dockyards, and there are private shipbuilding yards at all the chief commercial ports.

797. Of the inland towns of France not connected with any special industry the most worthy of mention are Toulouse, on the Garonne, at the confluence of the Canal du Midi (**771**); Orléans and Tours, on the Loire; Angers, at the confluence of the Mayenne and Sarthe. Dijon and Macon are important centres of the trade in burgundy wine, Reims and Épernay of that in champagne. The river port of Strasbourg has already been mentioned (**788**).

Strasbourg	180,000	Mulhouse	95,000
Nantes	170,000	Brest	90,000
St. Etienne	150,000	Limoges	90,000
Toulouse	150,000	Angers	85,000
Havre	140,000	Tourcoing	80,000
Rouen	125,000	Grenoble	80,000
Reims	120,000	Dijon	75,000
Roubaix	120,000	Tours	75,000
Toulon	105,000	Orléans	72,000
Amiens	95,000	Besançon	60,000

BELGIUM

798. The **surface** of Belgium is made up of a tableland intersected by deep river valleys in the south-east, sloping down to low flat plains, partly below sea-level, in the north and west. The plains afford admirable facilities for inland navigation both by river and canal (**147, 772**), and these facilities are still undergoing extension. (See below under Antwerp.)

799. The high density of population is pretty uniformly distributed over the greater part of the country. Only the province of Luxemburg, in the south-east, on the tableland of the Ardennes, has a density of population low enough to be compared with that of the English county of Hereford. Another district of low density is that called the Campine, on the north-east—a sandy plain, formerly heathy or marshy, but now mainly reclaimed, and producing excellent butter, the best, it is said, in Belgium. This high density of population is due, as in England, both to advanced agriculture and to the great development of manufacturing industries, the latter being favoured by abundance of the minerals most essential to modern manufactures, as well as by admirable facilities for transmarine and inland commerce. Two languages are spoken by the bulk of the population—Flemish by those living north of a line drawn from the south of the province of West Flanders to the north of that of Liège, French by those to the south of the line. In a small district in the south-east the language is German.

800. Three-fourths of the surface are in crops, bare fallow, and grasses, the principal crops being wheat, rye, and oats. Among the minor crops are beet, including sugar-beet, buck-wheat, and flax. Flax is grown mainly in the district drained by the Lys, a left-bank tributary of the Escaut, and the fibre obtained from it has long been known for its excellent quality, which is due to the circumstance that the district named is remarkably free from lime salts, in consequence of which the water of the Lys is peculiarly well suited for the cleansing of the fibre. The centre of the trade in this commodity is Courtrai.

801. At the last agricultural census of Belgium 36 per cent. of the surface in cultivation was cultivated by the owners themselves. Most of the landed properties are small, but small farming is even more general than small property-holding, the size of the majority of the holdings being about as small as those on the plains of Bengal (**1052**).

The productiveness relatively to area is very high (**242**), and this is not due to natural fertility, except in the rich polders or embanked areas reclaimed from the sea.

802. The **mineral wealth** of Belgium consists chiefly in coal and zinc. The coalfield [1] may be described as occupying the valleys which intersect the Belgian plateau from the eastern frontier near Aix-la-Chapelle to about the middle of the Franco-Belgian frontier, the principal valleys in this respect being those of the Sambre and Meuse, more especially that part of the Meuse valley which continues the line of the valley of the Sambre. Geologically, this strip is formed by a series of carboniferous strata lying on the north-western margin of a Devonian plateau which extends eastwards into Germany. The chief coal-mining districts are round Mons (the Borinage district), in Hainaut, near the French frontier, and round Charleroi in eastern Hainaut. Borings seem to give promise of the profitable extension of both of those fields, especially that of Charleroi to the south, but a still greater increase of the Belgian coal production is expected from the Campine coalfield [2] extending westwards, it is believed, from Dutch Limburg about the 51st parallel of latitude to near Antwerp, through a length of about 50 miles with a width of about 7 to 12 miles. The aggregate thickness of workable coal-seams (with a minimum of 16 inches) in this area varies from 3 to 26 feet. Much of the coal is 'long flame,' well adapted for use in glass (**596**) and pottery making. Zinc is obtained at Moresnet, close to the eastern frontier between Verviers and Aix. There are also productive lead-mines near Verviers. Excellent glass sands are found especially in the Campine. Iron ore exists, including considerable quantities of bog iron ore, said to be self-renewing in twenty years, in marshy parts of the Campine, but the production is small, and the high place which Belgium takes in the iron industry (**539**), is mainly due to its wealth in coal and its geographical situation, under which head one must take into account the proximity of the very abundant iron ores of the grand-duchy of Luxemburg (**817**) and the north-east of France (**780**).

803. The **manufactures** stimulated by the existence of this mineral wealth are numerous and varied, and it is worthy of notice that the textile manufactures which predominate are those originally stimulated by local supplies of raw material, namely linen and woollen. The tables of Belgian exports in the Appendix show that linen and woollen yarns are the chief special exports that may be classed under this head, and the former branch is fostered by the advantages for flax-growing already referred to, the latter by the sheep-pastures of the Ardennes (**785**), as well as by the large supplies of wool obtained from the River Plate (**319**). The spinning and weaving of linen are

[1] See map, p. 390.

[2] The first ton of coal was extracted from this coalfield at the end of 1917, and a year later three out of nine pits were ready.

carried on chiefly at Ghent, Tournai, Courtrai, and other western towns (in Flanders) in or near the flax-growing region ; but the linens of Courtrai are not made with the fine fibre of native production, but of coarser material imported from Russia. The town most noted for its woollen cloth is Verviers, which lies close to the Ardennes and the coal-supplies of Liège. Ghent is the centre of the cotton-manufactures. Brussels, the capital of the country, has numerous industries, but is not specially a manufacturing town, though it may be here mentioned on account of its lace. The sixteenth century Willebroeck Canal has been so far improved as to allow of small sea-going vessels reaching Brussels.[1]

804. Verviers presents a remarkable instance of the persistence of an old industry, its woollens having been noted as far back as 1432. It also exports very large quantities of woollen yarn, or a hybrid between woollen and worsted yarn (**327**), and of washed wool, the last branch of the industry being due to a local advantage turned to account by science and common sense. A committee having ascertained that the presence of lime in water is prejudicial to the scouring of wool, a dam was constructed across a small stream in the neighbourhood which flows over slate and sandstone, and the water of which is free from the noxious ingredient. By that means an abundant supply of suitable water was obtained.

805. Next in rank to textile manufactures in the aggregate among Belgian mechanical industries stand those connected with the working of iron. Among these the making of machinery is first in importance, and the chief seat of this branch is Liège with its suburb of Seraing. Liège, which can be reached by barges of 1,000 tons, is one of the most important seats of the manufacture of firearms in the world.

806. The situation of Liège is highly characteristic of the eastern towns of Belgium generally. The antiquity of the place is shown by the fact of its having been known to the Romans under the name of *Lugdunum Batavorum*, and during its whole history it has been an important centre of trade. This ancient importance is explained by the features of the surrounding country. Liège lies, like Namur, Verviers, Huy, and other important towns in the east of Belgium, in a narrow valley of the south-eastern plateau. It lies, however, just where the valley of the Meuse, to which it belongs, begins to open out on the left so as to afford free communication in various directions towards the west and north, and where also the valley of the Ourthe opens a way to the south through Belgian Luxemburg, and that of the Vesdre, eastwards by way of Verviers and Aix-la-Chapelle to the Rhine. Its position may hence be compared with that of Manchester and Leeds, and all the more nowadays when the mineral wealth of the neighbourhood is so important (**724, 730**).

[1] The improvements are still going on, and quayage with a depth alongside of 21 feet is now being provided at Brussels.

Brussels . . .	700,000	Liège	170,000
Ghent	175,000		

807. The industry[1] and commerce of Belgium being in many respects similar to those of the United Kingdom, a comparison of the tables in the Appendix showing the trade of these countries is instructive. For that the reader is referred to the notes under the table showing the countries of origin and destination of the commodities entering into Belgian foreign and colonial trade. The Congo Territory has been a Belgian colony since February 1909.

808. For the distribution of the products of its industry, and the reception of products of other countries, no country on the European mainland has greater natural advantages than Belgium, among which may be mentioned this, that the extreme flatness of a large part of the country enables even the roads to compete with the railways. Light railways making use of the roads are an important auxiliary in inland transport. On the land side, Belgium lies close to some of the most populous parts of the surrounding countries, and in Antwerp it possesses a seaport vying in situation with that of London.

809. Like London, Antwerp lies on a tidal river, the Scheldt, at the head of a deep estuary. It stands on the right bank of the river, and is strongly fortified. It has the advantage over London of having a much more extensive and capacious system of inland navigation subsidiary to its transmarine commerce. From the map on p. 359 it will be seen that this port is connected by first-class waterways with the Meuse, Seine, and Rhine, this last being reached by the channels between the islands of Zeeland. A scheme is now (1921) being actively pushed for constructing a more direct waterway to the Rhine, designed to run first east by Herenthals, then by a more southerly route through Genck in the Campine coalfield (with a branch thence to Liège), and then by München-Gladbach to the Rhine opposite Düsseldorf. Barges of 1,000 tons can reach and ascend the Meuse to Liège. Being the nearest great port to the principal manufacturing region of Germany (**847**), it is the chief outlet for that region for goods requiring railway transport, and this fact has greatly contributed to the recent development of the port.[2] In former days Antwerp reached the height of its prosperity in the sixteenth century. It afterwards declined from

[1] An industrial census of Belgium was taken in October 1896. From this it appears that 690,000 persons were employed at that date in factories, workshops, mines, &c., the male and female employees being in the ratio of about 5 to 1. In the weaving of cotton and woollen fabrics 46 per cent. of the employees were still engaged on hand-looms, and in linen weaving 61 per cent.; in the hosiery trade less than 6 per cent., and in the boot trade less than 3 per cent., of the employees worked with the aid of power-driven machines. Nearly half the coal-miners worked between 9 and 10 hours a day, and in other industries only one-tenth of the work-people had a working day of less than 10 hours. See the abstract of this census in *Econ. Journ.*, 1902, p. 530.

[2] In 1887 the tonnage entering the port from the sea was under 4,000,000, in 1913 above 14,000,000. The inland water traffic, however, did not grow at the same rate. In 1887 the tonnage that arrived was somewhat above 2½, in 1913 somewhat above 3½ millions.

Antwerp . . . 325,000

political causes, but since the navigation of the Scheldt was made free in 1863 it has once more risen to a high rank among continental seaports, and for a time outstript its Dutch rival, Rotterdam. Its further progress is impeded, however, by the difficulty of the navigation of the Scheldt immediately below Antwerp, and the inadequate accommodation at the port, but these obstacles to development are being removed. On a rising tide large ocean liners can reach the excellent quays alongside the river. Two large docks were opened in 1914.[1] (See also **814.**)

810. Ghent, at the confluence of the Lys and Scheldt, was made a seaport in the modern sense in 1886 by means of a ship canal from the estuary of the Scheldt at Terneuzen, admitting vessels of 2,500 tons burden ($17\frac{1}{2}$ feet draught), and further deepening to nearly 29 feet has made it since 1913 available for much larger ships. Ostend, which lies amongst the downs on the south-west, is the only other Belgian seaport of importance ; but Bruges,[2] one of the older rivals of Antwerp, is likely now to revive as a seaport, since the opening, in 1900, of a canal to the sea with a depth of 26 feet 3 inches. Its new outport, Zeebrügge, is to have a harbour capable of admitting at one time twenty-one of the largest Atlantic liners.[3]

[1] The maximum depth alongside the river quay is at present 38 feet. The present plan for improving the port includes the provision of more than $3\frac{1}{2}$ miles of additional quays on the Scheldt below the present quays, and the construction of a canal 1,300 feet wide across the bend of the Scheldt below that to rejoin the river about nine miles nearer the mouth.

[2] See also par. **814.**

[3] With regard to the transit trade of Belgium see pars. **860, 873.**

HOLLAND, OR THE NETHERLANDS

811. The kingdom of the Netherlands proper, that is, the state that lies to the north of Belgium, is mainly an agricultural and commercial country. It has no highland region, and little of the mineral wealth that characterises the highland region of Belgium, though it may be mentioned that important salt deposits have been discovered near the German frontier. In the eastern provinces of Drenthe, Overijssel, and Gelderland a large part of the surface is marshy and occupied by peat moors, which considerably reduces the area available for crops and pastures. The whole extent of land capable of being so utilised is little more than three-fifths of the entire area; but, on the other hand, a large part of the agricultural region is of very exceptional fertility. This is especially the case with those parts, chiefly in the provinces of Zeeland and Holland proper, which lie below the level of the sea and have been regained from the sea by centuries of labour. From the nature of the case these tracts can have no natural drainage, and there are other extensive areas which, though above sea-level, yet lie so low that they cannot be drained by ordinary means. Hence **polders**—that is, enclosures surrounded by dykes or embankments and provided with pumping-machinery—form the characteristic scenery of the most populous parts of the country. The soil of such areas is naturally moist, and thus best fitted for rich pasture grasses, so that horses and cattle are very numerous, and the cattle yield abundance of milk. Hence it is that butter takes so high a place among the special exports of Holland, and that cheese also is an important Dutch commodity. The western provinces above mentioned, together with the northern province of Friesland, are those which are most noted under this head.

The other crops of Holland are similar to those of Belgium, even sugar-beet and tobacco being among the number, though the latter occupies a very limited extent of ground.[1]

812. In **manufacturing industry** Holland formerly had a high reputation. The dearth of minerals, however, is adverse to the

[1] Schemes for extending the agricultural area of Holland by the drainage of the Zuider Zee or part of it have been again and again proposed. At present the Dutch government is seriously considering the formation of a great polder nearly 50,000 acres in extent in the western part of this inlet between Wieringen island in the north and that part of North Holland which lies to the west of Medemblik in the south.

carrying on of manufactures by machinery. Recently indeed a continuation of the Westphalian coalfield has been found to pass under the south of the province of Limburg, in the extreme south-east of the country, near enough to the surface to afford seams of workable coal, and now there is a small production of coal from state coal-mines.[1] This, however, is far from meeting the requirements of the country, but coal is cheaply imported both from Germany and Great Britain, and cotton, linen, and woollen spinning and weaving by modern methods are all largely pursued. The chief cotton and linen manufacturing towns of Holland, Enschede, Almelo, Hengelo, &c., are situated in the south-east of the province of Overijssel, where the cotton industry was established before the close of the eighteenth century. Linen manufactures and many others are carried on at Tilburg, in North Brabant. A great variety of textile and other manufactures are carried on at Utrecht. Delft still retains manufactures of earthenware, for which it was once famous. Plates for shipbuilding are obtained from Germany at such a cheap rate that the majority of the towing vessels plying on the Rhine even in Germany are built in yards at the mouth of the Rhine and Meuse.

813. In **foreign commerce** Holland has stood in the front rank of nations from the very beginning of its separate existence, and among the facilities for foreign commerce the waterways, natural and artificial, have greater importance in Holland than in any other European country. In 1900 the length of river and canal navigation was nearly twice as great as the length of railways. (See **147.**)

814. It may be convenient to consider here the commercial development more particularly of the maritime provinces both of the modern Belgium and the kingdom of the Netherlands, inasmuch as the same geographical conditions have in a large measure affected those of both countries. The waterways of the Rhine, the Meuse, and the Scheldt have at all times given to the ships of these provinces access to the interior of important parts of the continent. Most important was the Rhine with the Rhine valley which, where the river itself in past times was not navigable, has been used as a highway into the interior of Europe from prehistoric times downwards. The towns that first rose to high commercial importance in this region were the Flemish ports of Bruges and Ghent. For this there seem to have been from the first two chief reasons. First, the northern ports more directly connected with the Rhine lay in a district where much reclamation of land had to be done before a large population could grow up. Second, the ports just named were nearer the centres of influence of the old Roman civilisation, which still survived and continued to be propagated in spite of the convulsions by which the empire had been overthrown. Arras, now in the French department of Pas-de-Calais, was the focus

[1] Output of Dutch coal-mines in 1912, 1,700,000 tons: in 1918, 3,400,000 tons.

of civilisation for the whole of northern Flanders.[1] That the navigation of the Rhine was of importance to the Flemish towns at an early date is shown by a record of the year 1178, in which reference is made to an already long-existing right of commerce on that river even above Cologne enjoyed by the people of Ghent. At an early date also the vicinity of the Flemish ports to England was a matter of great importance, and particularly during the period when so much English wool was wrought up in Flemish towns (thirteenth to the fifteenth century). During this period Bruges had the advantage of possessing a great harbour at the head of the Zwin channel, which then ran due north to the estuary of the Scheldt. With the same harbour Ghent was connected by canal (after the middle of the thirteenth century) at an even earlier date than the connection with Terneuzen was established (first after 1329). Antwerp rose into importance later than Bruges and Ghent. Physical changes first established its communication with the sea by way of the West Scheldt in the latter part of the thirteenth century, and it profited greatly by the silting up of the Zwin, which deprived Bruges of its harbour in the course of the fifteenth century. Of the towns in Holland, Leiden and Dordrecht were among the first to rise into prominence through the Rhine traffic, but the progress of Dordrecht was arrested by a great flood which in 1421 overwhelmed the adjoining district. After the discovery of the sea-way to India in 1497–99 (**215**), a great accession of wealth came to the ports of the Low Countries through the commerce carried on by them in eastern products. These were brought by the Portuguese to Lisbon, but Lisbon is not situated, like Venice and Genoa, in such a position that they could be distributed thence into the heart of Europe. From the Italian ports, after being carried across the Alps, they were conveyed by the Rhine and Elbe down stream. After the sea-route to India had been opened up, they were carried into the heart of Europe by the Rhine and Elbe up stream. A sudden increase of prosperity was brought to the Dutch towns owing to the circumstances in which the northern provinces of the Netherlands became a separate political community. In 1579 the seven northern provinces proclaimed their independence of Philip II. of Spain, to whom at that time all the Netherlands belonged. The cause of the revolt was the attempt of Philip to put down the Reformation throughout his dominions. In the Seven Provinces, however, freedom of conscience was proclaimed, and that caused a rapid immigration into Dutch towns of Protestants and Jews, many of whom brought with them the manufacturing skill that had already been raised to a high pitch in Flanders and Brabant, Liège and Namur. Before the close of the sixteenth century the Dutch had made their first voyage direct to the East. In 1602 the Dutch East India Company was founded, and within forty years after that the Portuguese acknowledged with bitterness that almost the entire trade with the

[1] Warnkoenig, *Hist. de la Flandre*, ii., p. 182.

distant East had passed out of their hands into those of the Dutch. The commercial predominance of the Dutch in the Malay Archipelago has lasted down to the present day, although their trade generally, including their eastern trade, has been eclipsed by the development of the greater resources of Great Britain.

815. The **seaports** of Holland have not as great natural advantages as their Belgian rival Antwerp, but no pains or expense have been spared to enable the two chief ports, Amsterdam and Rotterdam, to meet the requirements of modern commerce. Amsterdam, on the IJ, near its old mouth in the shallow Zuider Zee, was formerly difficult of access for large ships.[1] Communication with the sea was first facilitated by the construction of the North Holland Canal to Helder, at the entrance to the Zuider Zee; but as ships became larger this proved inadequate, and finally a direct communication with the sea was made by means of the North Sea Canal, which is 26 feet in depth, and brings Amsterdam to within a distance of fifteen miles from the new harbour of IJmuiden. This canal was completed in 1877, and the shipping of Amsterdam has in consequence increased very rapidly since that date. The internal communications of this port were greatly improved in 1892 by the opening of the Merwede Canal ($10\frac{1}{4}$ feet deep), running southwards to Vreeswijk on the Lek and Gorinchem (Gorkum) on the Waal. By this means large vessels are enabled to reach the Rhine (**827**).

816. Rotterdam, on the common mouth of the Lek (now the chief Rhine-mouth) and the Maas, is a port liable to be obstructed by the copious deposits of sediment brought down by those streams. The entrance from the sea to the river on which it stands is too shallow to be entered by large vessels, and the first route to the sea constructed for them was a canal through the island of Voorne, entering the Haringvliet at Hellevoetsluis. Now this has been superseded by the 'New Waterway,' which enters the sea to the north of the mouth of the Maas. Opened in 1872, this new route was at first too shallow to allow large vessels to ascend without discharging part of their cargo, but it has since steadily been deepened, and improvements are constantly being made.[2] The port, which includes Delfshaven, is the natural port of the Rhine and the Rhine valley, and has greatly benefited by the recent improvements in the navigation of the Rhine above the Dutch

[1] The IJ island has above 12,000 feet of quayage, with a depth of 32 feet alongside.

[2] Ships drawing 23 feet can reach the port at any time, and those of 28 feet draught at high-water spring-tides. Dredging, however, is constantly being carried on, and the navigable channel is to be increased as soon as possible to a width of about 330 feet with a low-water depth of 32·3 feet and a high-water depth of 38·6 feet. A floating dock 600 feet long by 160 feet wide with a capacity of 50,000 tons was installed in 1920. The total tonnage that entered the port in 1912 was nearly 12,800,000.

Amsterdam . . .	650,000	Rotterdam . . .	500,000

frontier (**827**), which make it pre-eminently the port of the Rhine basin for bulky cargoes such as grain, oil, and petroleum. In the import of grain Rotterdam has latterly come to excel Antwerp, the natural advantage of access to the Rhine having been reinforced by the provision at the port of large floating elevators. According to the statement in the Report of the Royal Commission on the Port of London [1] none of the leading ports of Europe showed so great an increase in the amount of its shipping at the end of the nineteenth century. In the last decade of that century the shipping that entered the port increased by upwards of 100 per cent. It is the seat of the Rotterdam Lloyd, a shipping company vying in importance with the Netherlands Shipping Company, which has its seat in Amsterdam and connects the Netherlands with its rich East Indian colonies as well as with its less productive possessions in South America. Besides the mass productions above mentioned Rotterdam has a large trade in raw cotton and sugar, and it now ranks next to London as a market for tea. A noteworthy feature of the trade of the port is the fact that the amount of the shipping that enters with cargoes is more than twice as great as that which clears, a fact on which some light is thrown by what is stated below (**827**) as to the Rhine traffic at Emmerich. The ships leaving in ballast mostly go to Great Britain for coal or other cargoes. The Hook of Holland (*Hoek van Holland*) has been since 1892 an important place of passenger traffic with Harwich. The minor ports of Holland are Schiedam, Harlingen, Dordrecht, Groningen, and Flushing (Vlissingen). Formerly cut off from the mainland by the channels between the islands of Walcheren and S. Beveland, and between this latter island and the province of N. Brabant, Flushing has since the construction of the railway connecting it with the interior become a rival of Ostend for postal and express traffic of high value in proportion to its bulk with the northern parts of central Europe (**626, 641**); but, owing to the tendency of bulky traffic to penetrate as far inland as possible so as to extend the advantage of cheap carriage, it is hardly likely to deprive Antwerp, higher up on the Scheldt, of traffic of that kind to any serious extent. Harlingen, in Friesland, on the Zuider Zee, has a considerable trade with England. Terneuzen is important from its situation at the mouth of the ship-canal leading to Ghent. Since the opening of the Dortmund-Ems Canal (**827**) the Dutch government resolved to raise Delfzijl opposite the German port of Emden into a port of the first rank, and to enlarge and deepen the canal connecting it with Groningen, but though the facilities have been increased the trade has not grown greatly. The only towns in the Netherlands with more than 100,000 inhabitants which are not seaports are the Hague

[1] Cd. 1151, 1902, pp. 18–19.

The Hague	350,000	Groningen	90,000
Utrecht	140,000	Leiden	60,000

and Utrecht. The Hague (in Dutch *'s Gravenhage* or *Den Haag*) is the seat of the court and of the Dutch legislature, although Amsterdam is officially regarded as the capital of the country. It is rapidly increasing in population, but mainly in consequence of its attractions as a residential city. Arnhem, situated where the Lower Rhine (the Lek) changes its course from a north-westerly to a westerly one, a situation in itself likely to bring about a convergence of traffic **(194)**, is the principal inland centre of trade, bringing especially the poorer north-eastern provinces of the kingdom into communication with the agriculturally richer maritime provinces and with the sea.

GRAND-DUCHY OF LUXEMBURG

817. This is a small independent State, about 1,000 square miles in extent, wedged in between Belgium, Rhenish Prussia, Lorraine, and France. The grand-duchy belongs since September 1919 to the French Customs Union. It mainly consists of high ground deeply furrowed by narrow valleys. Small as it is, it has a high degree of economic importance, from the fact that it has in the extreme south very productive deposits of iron ore, immediately adjoining similar deposits in France. Much is exported beyond the customs frontier, but more than half is smelted locally.

NORTH CENTRAL EUROPE
THE GERMAN REALM, DANZIG, POLAND

1. THE GERMAN REALM[1]

818. The German Empire had before the war an area 70 per cent. greater than that of the British Isles, with a population about 36 per cent. more numerous. The population was thus less dense than that of the British Isles, but it was increasing more rapidly (**714**).

819. As a commercial unit the German Empire, or rather the Wirtschaftsgebiet, or Economic Union, which now takes the place of the Zollverein, or Customs Union, to which all the data in the commercial tables in the Appendix refer, included the grand-duchy of Luxemburg in addition to the whole territory of the empire, with a few trifling exceptions. As the formation of this Customs Union was of the greatest consequence for the industrial and commercial development of Germany, the various steps by which it was brought about are worthy of being placed on record. The first important step towards the diminution in the number of customs barriers within the present territory of the German Empire was the abolition of all internal customs dues within the kingdom of Prussia, as it then was, by the law of May 26, 1818, which came into operation on January 1, 1819. At that time it is said that no fewer than sixty different customs and excise tariffs were in force in Prussia alone. A movement was then set going towards a union among different German states. To this movement Prussia was averse, and the conferences held between representatives of a number of south German states were at first fruitless. At last a union was effected between Bavaria and Württemberg on January 18, 1828. In the month following a separate union was established between Prussia and the grand-duchy of Hesse (Hesse-Darmstadt). The northern and southern unions then made approaches to each other, and in May 1829 a treaty was concluded between them according to which the two unions agreed to bring their fiscal systems more and more into harmony with each other. Four years later it was agreed that on January 1, 1834, the two unions should merge in one, and before

[1] The German Republic, which succeeded the Empire by the revolution of Nov. 9, 1918, and for which a constitution was adopted on August 11, 1919, retains the official designation of *Das Deutsche Reich*, but the designation of Realm, which has sometimes been used in English for the new state, seems worthy of adoption.

that date Saxony and the Thuringian States agreed to become members of this union also. This date accordingly marks the beginning of the first comprehensive union, but it is important to note that the two great divisions of the kingdom of Prussia, as it then was, were still severed by the kingdom of Hanover, which remained aloof. In 1835 the Union was joined by Baden, in 1836 by Nassau, Frankfurt-on-the-Main, and some other small States, but not till 1851, when Hanover joined, did the Union embrace a continuous territory throughout the north German plain. In 1852, Oldenburg and Schaumburg-Lippe added their territories to the union. In 1865, when the Duchy of Lauenburg was annexed to the kingdom of Prussia, and in 1866, when those of Schleswig and Holstein were annexed to the same kingdom, these duchies also became included in the Union, and, after the dissolution of the North German Confederation, the grand-duchy of Luxemburg, which had been a member both of the Confederation and the Customs Union, while made politically by the treaty of London an independent neutral territory, continued to be included in the Customs Union. In 1868 the Union was further extended by the accession of the Mecklenburgs and Lübeck, and the Customs Union was completed within pre-war limits by the inclusion of Hamburg and Bremen, with the exception of the parts reserved as free-ports, in October 1888. Finally, the Customs Union was enlarged into the Economic Union by the inclusion of all free-ports on March 1, 1906. (See the notes on the table of German exports in the Appendix.)

820. Surface and Communications. The great plain which makes up north and the greater part of east Germany is for the most part of but slight fertility, and endowed with little mineral wealth, except here and there salt. It is thus on the whole a region of low density of population. The greater part of it is not relatively more populous than the south and west of Ireland, the more densely peopled areas within it being chiefly those on the lower parts of the Elbe, Oder, and Vistula, and on the area (including Berlin) between the Elbe and Oder where these two rivers approach one another between lat. 52° and 53°.

821. The remainder of the empire consists mainly of hilly country and tablelands, and has for the most part a density of population as high as that of the south-east of England, with a few smaller tracts in which the density reaches or approaches that of the English and Scotch manufacturing districts. This higher density is due partly to the more fertile soil and more favourable climate of the sheltered valleys, partly to mineral wealth and manufacturing industry. In the south-east of the western half of the empire, a region occupying fully the half of Bavaria, and composed in large part of a bleak tableland with a poor soil, and without mineral wealth (except once more salt), has as sparse a population as the greater part of the plain. The height of this tableland is about 1,000 feet lower than that of France (Munich, 1,700 feet).

822. In the highland region of south-western Germany the importance of the Rhine valley **(814)** as an avenue for communication north and south, is strikingly illustrated by the fact that two double lines of railway, one on either bank of the river, ascend the entire gorge from Cologne to the base of the Taunus, and there are several parallel lines higher up. On the south German frontier the Erzgebirge present a serious barrier to communication, on account of the fact that they lie between the most densely peopled parts of Bohemia and Saxony, where there is an interval of about forty miles or more uncrossed by rail. The Bohemian Forest, on the south-west of the province from which it takes its name, has an interval of more than fifty miles uncrossed by rail between the break in the chain at Furth and the gap in the north at Eger—the gap which separates the Bohemian Forest from the western end of the Erzgebirge, and towards which several railways converge. There is another railway crossing-place in the Bohemian Forest just to the south of the culminating peak, Mt. Arber, but between this and the Danube (about forty-five miles) there is no other railway from east to west. The Bohemian Forest, however, separates the less densely peopled parts of Bavaria and Bohemia. The Sudetes have an interval of about fifty miles uncrossed by railway, between thickly peopled parts of Silesia on the one side, and Bohemia and Moravia on the other, and at their south-eastern extremity several railways converge to the relative depression known as the Moravian Gate between the Sudetes and the Carpathians.

823. Of the six great railway routes which cross the Alps beyond the frontiers of Germany, three, two in Switzerland and one in the Tirol, are of the highest importance to German commerce. For the commerce of Germany that of St. Gothard is the most important **(867)**, leading as it does directly from the most populous parts in the west of the realm, through the most populous parts of Switzerland, to the most populous parts of northern Italy. Next in importance is that by way of the Brenner (the valleys of the Inn and Adige), which is the direct route between the most populous parts of Middle Germany (including Berlin) and the eastern part of the north Italian plain. The Simplon tunnel, supplemented by the Lötschberg tunnel, adds a rival route between Italy and south-western Germany. The railway across the Semmering Pass (in the east of the Niedere Tauern), by way of Vienna and the Sudetes, or by way of the Moravian Gate, connects the port of Trieste with the south-east of Germany.

824. Of the mountains entirely within the German frontier, the Thuringian Forest is crossed by rail, but the Harz Mountains are still a railway barrier for a distance of sixty miles, though railways partly ascend some of the valleys on both sides.

825. Most of the German railways are now the property of the individual states, state purchase having proceeded very rapidly, especially since 1879. At that time Germany was very poorly supplied

with railways. The mileage was less than one-fifth greater than that of the United Kingdom, notwithstanding the much greater area and population. Since then, however, the railway system has been extended rapidly, and in the first decade of the twentieth century, when the annual increase of railway mileage had long been declining in the United Kingdom, it still showed a tendency to increase in Germany. Now Germany has a greater railway mileage than this country relatively to both area and population, but it is doubtful whether that would be found true if we could make a comparison of the length of single lines.

826. In the plains and valleys the natural and artificial waterways are also of great value to the commerce of Germany. The Rhine, the Elbe, the Oder, and the Vistula are all navigable to the neighbourhood of the German frontier or beyond it; the Fulda and Werra, the two headwaters of the Weser, to about lat. 51°; the Danube from Ulm. The length of navigation on the Rhine from Basel, just within the Swiss frontier, is 510 miles; on the Weser, to the head of navigation on each of its head streams, about 310 miles; on the Elbe, from the frontier 450; on the Oder, from Ratibor, 480; and on the Danube to the frontier, 240.

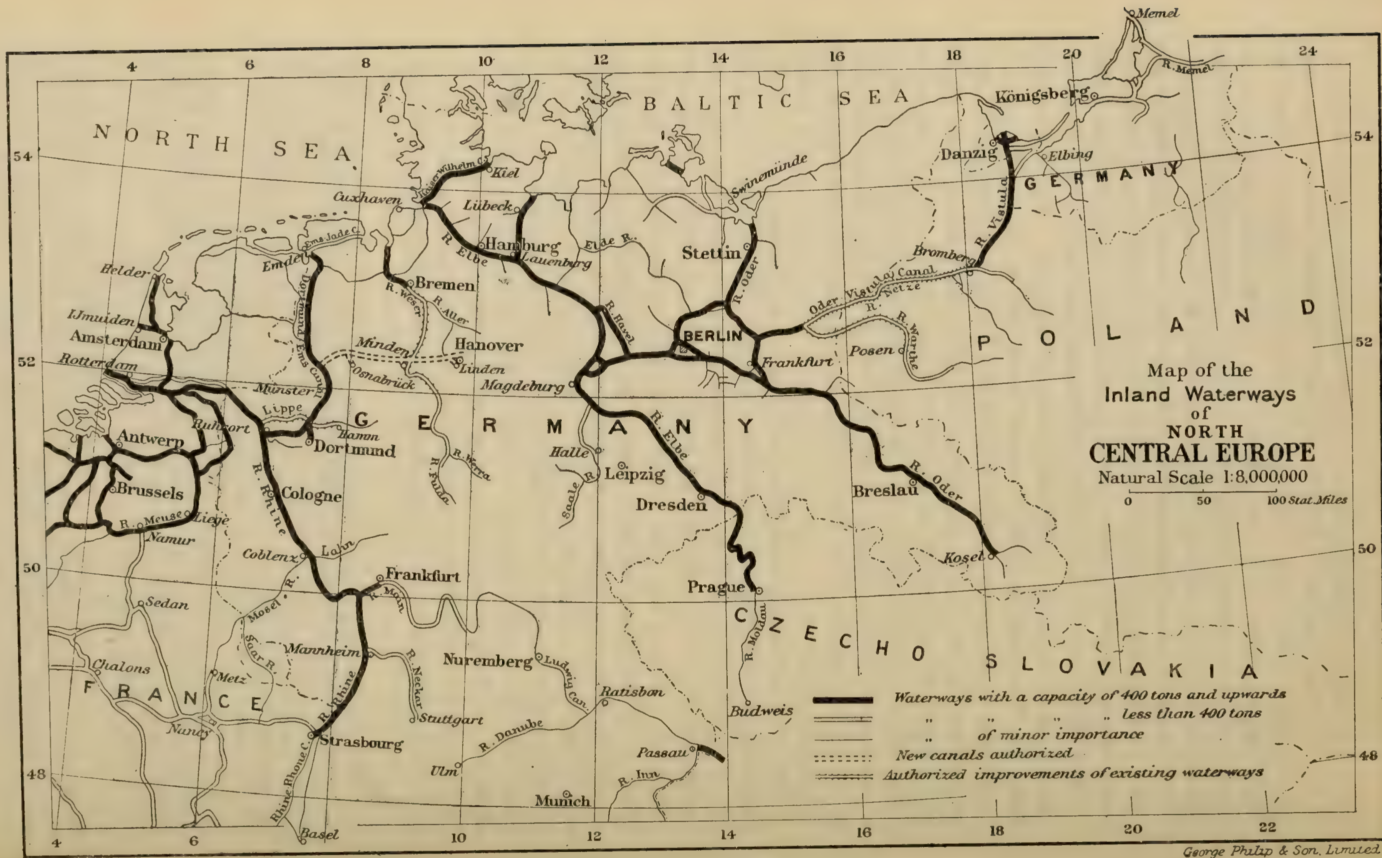
827. But neither these figures nor the waterways map[1] on next page fully indicate the value of German waterways. Of the total length of inland waterways (upwards of 8,000 miles), even before the improvements sanctioned by the law of 1905, 1,870 miles were available for vessels of nearly 5 feet, and 1,451 miles for vessels of about 5¾ feet draught. The Rhine navigation[2] as high as Mannheim far excels that of all other German waterways, probably, at least in respect of quantity, that of all other rivers in the world. Probably no other river has so large a population gathered in large towns on its banks, a circumstance peculiarly favourable to water traffic.[3] The Rhine below Mannheim as far as the Dutch frontier has been so improved by the State that in 1899 a minimum depth of about 9·2 feet at low water was available for the greater part of the year, enabling barges of upwards of 2,000 tons

[1] This map shows the improvements sanctioned by the law of April 1, 1905, which will result in providing Germany with two systems of inland waterways, an east and a west. The improvements in the east will enable vessels of 400 tons to reach the Vistula east of Bromberg, and to reach Posen from the Oder. The improvements in the west will enable vessels 213 feet long and of 600 tons burden to pass from the Rhine to Hanover. See also **651, 652.**

A project for the continuation of this canal to the Elbe was stopped on account of the opposition to it chiefly on the part of Hamburg and the agriculturists of the east, but since the war it has been revived, but with a modification of route. Instead of running due east it is proposed to make it run first south-east through the iron-field of Peine and then to the Elbe above Magdeburg.

[2] See note to par. **771.**

[3] The aggregate population of towns above the Dutch frontier with above ten thousand inhabitants on the Rhine up to Basel and the Main up to Offenbach in 1910 was about 1,875,000, of which three, Cologne, Frankfurt, and Düsseldorf, had each a population of 300,000. See an article on 'Inland Waterways,' by the author of this work, in *Geog. Jour.*, vol. xxx. (July, 1907).



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burden to ascend to that port. Extensive harbour accommodation has been provided at Cologne, Duisburg, Ruhrort, the port of the Ruhr basin (**833**), Düsseldorf, the port of the southern part of the great manufacturing district of western Prussia, Mannheim, and other river-ports. Ore-laden sea-going steamers regularly come up to the former port, and the sea traffic would no doubt be still larger if the Dutch would consent to deepen their part of the Rhine as much as the German port has been deepened. Most of the traffic is, however, carried on in barges. Three or four large barges, some with a capacity of more than 3,000 tons, are now to be seen dragged up and down by a single powerful steam-tug at one time. Further improvements are still in progress both above and below Mannheim. Even above Strasbourg the navigation has been so improved that for more than 200 days in the year it is possible for tugs to haul as high as Basel trains of barges of 1,000 tons each, which may have been loaded at London. The results of recent improvements on this navigation and the Elbe, together with the development of German commerce which they have helped to promote, are shown by the following figures :—

Tons of Goods in Millions and Decimals of a Million carried by Water.

	On the Rhine at Emmerich (Dutch Frontier).		On the Elbe just above Hamburg.	
	Up	Down	Up	Down
Average of 1881–85	2·59	1·72	1·17	1·10
In 1900 . .	9·04	4·13	2·78	2·52
In 1911 . .	17·63	13·72	5·85	4·84

The notable difference in amount between the up and down stream traffic on the Rhine is a result chiefly of the increasing dependence of the manufacturing regions of western Germany (**838**) on imported ores and grain, both being heavy commodities of the kind suited to water-carriage. In the three years 1898–1900 these two classes of commodities made up from 51 to above 59 per cent. of the total up-stream traffic. In 1900 upwards of 40 per cent. of all the grain (66 per cent. of all the wheat) and 44 per cent. of all the ores imported into the German Customs Union passed up the Rhine at Emmerich.[1] On the other hand, the chief market for the products of the manufacturing districts referred to is internal. Of those which are exported large quantities go by rail to Antwerp and others are diverted to German ports by specially favourable railway rates for export. Coal and coke make up nearly half the tonnage carried down-stream at Emmerich. Ruhrort at the mouth of the Ruhr is the great centre of this trade. Of the river traffic at Hamburg, grain (chiefly rye) made up in 1900 nearly twenty-six per cent. of the up-stream traffic ; but down-stream there were such heavy commodities as sugar (39 per cent. of the total), manures (13 per cent.), coals (5 per cent.). The waterway from Emden

[1] Corresponding particulars cannot now be obtained, but these figures are retained on account of their significance.

to Dortmund with a branch from Herne to Duisburg-Ruhrort is 8½ feet deep, and can be used for vessels of 750 tons. The enlarged Stettin Berlin Canal, opened in June 1914, will receive vessels of 600 tons, and will no doubt greatly increase the amount of English and Scottish coal received at Berlin in competition with that of Upper Silesia. The eastern rivers, though they have little traffic in ordinary goods, are still important for the floating of timber. No navigation dues are charged on German rivers, but under a law passed in 1910 tolls are to be leviable on all rivers deepened by the State so as to pay interest on the actual outlay.

828. A ship canal, known as the Kiel (or North Sea and Baltic) Canal, completed in June 1895, begins near Brunsbüttel on the Elbe, and is now large enough to allow of the passage of vessels of any size. It has only two locks, one at either end, and of these that at the east end is seldom closed, and the other is open for three or four hours in every tide. It causes a saving in distance of 237 miles, from the mouth of the Elbe, and a saving of greater or less amount for all North Sea ports to the south of the Tyne.[1]

829. In respect of **climate** Germany is less favourably situated than France, not only through being farther north, but also through being farther east (**55**), and on account of the high elevation of a large part of the south-west (**58**), that is, the region with the best climatic position both in latitude and longitude. Only in the valley of the Middle Rhine (the plain, namely, between the Vosges and the Black Forest) and those of the Neckar and Mosel are there seven months in the year with a mean daily temperature above 50° F., and only in the Middle Rhine district is there one month with a mean daily temperature of 68° F., or more (comp. **620**). On the other hand, except in the valleys mentioned, there is a regular increase from west to east in the duration of the period with a mean daily temperature below freezing-point. In a large part of the east this period lasts for at least four months.

830. This difference in climate results in a difference in the nature of the **crops.** In Germany, notwithstanding the greater area, the extent of land under corn-crops is fully one-twelfth less than in France, and the crops grown are less valuable than those of the latter country. Wheat [2] (including spelt) occupied in pre-war years about 4⅓ per cent. of the surface; rye, the chief bread-plant, nearly 11 per cent.; oats

[1] Though the canal is not used by large liners it is of importance to small vessels as enabling them to avoid the dangerous voyage round the north of Denmark, and the traffic through this canal increased from 1·5 million tons in 1895–96 to 6·0 million tons in 1906, to 6·3 in 1909, and to 8·6 millions in 1911. Still the revenue is inadequate to pay fair dividends and provide a sinking fund. By the Treaty of Versailles (1919) the Kiel Canal is free and open to ships of all nations at peace with Germany.

[2] Wheat in 1919, 3·2, rye 10·8, oats 7·1 per cent. of the reduced surface, all these crops occupying then a considerably (in the aggregate above one-fifth) smaller area than in the same surface in 1913—smaller also than in 1918.

about 8 per cent. Among green crops by far the most important in extent of ground occupied are potatoes, which cover nearly seven times as large a surface as in the United Kingdom (277). Though vine-cultivation reaches in Germany the most northerly limit in the world (**291**), the extent of ground in vineyards (chiefly in the sheltered valleys of the south-west) is less than one-sixteenth of the area so occupied in France. In the same region orchards abound, and a limited quantity of maize and tobacco is grown. As to German sugar-beet see **432**; as to hops see **300**; and as to wool see **315.**

831. The table below, showing the development of German agriculture as applied to its two chief bread-plants in pre-war years, is very instructive and may be compared with the table on p. 309.

German Crops of Rye and Wheat

—	1881–90		1902–11	
	Aver. area Thous. hectares	Aver. yield per hectare Kilos	Aver. area Thous. hectares	Aver. yield per hectare Kilos
Rye . . .	5863	1170[1]	6113	1667
Wheat . . .	1899	1487[1]	1888	2004

Difference in Total Yield and Additional Population for whom the Average Consumption is provided on the Average of 1902–11 *as compared with the Average of* 1881–90

—	Increase of Yield.	Average consumption, 1902-11.	Additional population.
	Mil. Kilos	Kilos per head	Millions
Rye. By improvement in production . . .	2914	146·5	20·0
,, By extension of area .	367[2]	—	2·5
Wheat. By improvement .	982	92·1	10·4
,, By diminution of area	— 22		

This great and important improvement may be accounted for first of all by the comparatively backward state of German agriculture in the earlier period. No comparison can be made with this country under the head of rye, but the comparison under the head of wheat is a fair one, inasmuch as in both countries it is grown only where the conditions are specially favourable. The yield of 1,487 kilos per hectare in 1881–90 corresponds to about 22 bushels per acre, as against 28 bushels for

[1] In a similar table given in a paper by the author of this work in the *Scot. Geog. Mag.*, 1908, p. 126, lower figures are given. The explanation is that a new and, it is believed, a more accurate method of estimating yields was officially introduced into Germany. For a time the two methods were published side by side, and the older figures have been corrected according to the ratio of the results of the old and new methods.

[2] 200 kilos per hectare allowed for seed.

the same period in the United Kingdom. There was thus room for improvement by better methods. The rapid increase of railways (**825**) has facilitated those improvements by cheapening the carriage of agricultural machinery and implements and fertilisers, in some kinds of which Germany is exceptionally rich (**835, 836**), and by extending the market for the produce The great increase of railways in the first decade of the twentieth century took place most largely in the agricultural districts.[1] Two notable features of German agriculture are the large and increasing proportion of female labour employed in it [2] and the enormous temporary immigration of labourers from Poland and elsewhere in the east at harvest time.

832. In **mineral produce** Germany takes a very high place, ranking among European countries next after the United Kingdom in total value of production. Among the minerals, coal (**513**) and iron (**534-39**), as in our own country, are the first in importance. The chief coal-basins (see map, p. 390) are that of the Ruhr,[3] in Rhineland and Westphalia; that of the Saar,[4] in Rhineland, north of Lorraine; that of Zwickau and Lugau, in the kingdom of Saxony, at the base of the Erzebirge; that of Upper Silesia,[5] in the extreme south-east of the province, and that of Lower Silesia, a smaller coalfield to the south-west of Breslau. The Prussian state has acquired coalfields both in Westphalia and Silesia. Lignite (**510**) is abundant in Prussian Saxony and the Thuringian States, where it has given rise to a large mineral oil industry, and likewise furnishes fuel for the numerous sugar refineries of the district. It is important to note that the value of lignite has been greatly enhanced by using it on the spot for the development of electric power. Vast works have been erected near Halle for the manufacture of nitrogen fertilisers,[6] and other large installations for long distance transmission of electrical power, especially in the lignite basins east and west of the Rhine gorge. Lignite briquettes are now also largely used in the finishing branches of the iron and steel industry. The production of petroleum, chiefly in Hanover, is rapidly acquiring importance.

833. The map on p. 390 shows the principal seats of iron ore pro-

[1] See *Die Verwaltung der öffentlichen Arbeiten in Preussen* 1900 *bis* 1910, Berlin, 1911, Kartenbeilage I.

[2] At the occupation census of 1907 female employees in agriculture made up 47 per cent. of the total (compare 3·25 per cent. in England and Wales, 13·75 per cent. in Scotland at the census of 1901). According to the German occupation census of 1895 the percentage of female employees was only 33·7, but the difference is partly to be explained by the fact that in 1907 members of a farmer's family working for wages were more careful to get themselves registered as such so as to secure insurance benefits.

[3] Production of coal in Ruhr basin in 1913, 115 million metric tons; in 1919, 71 millions.

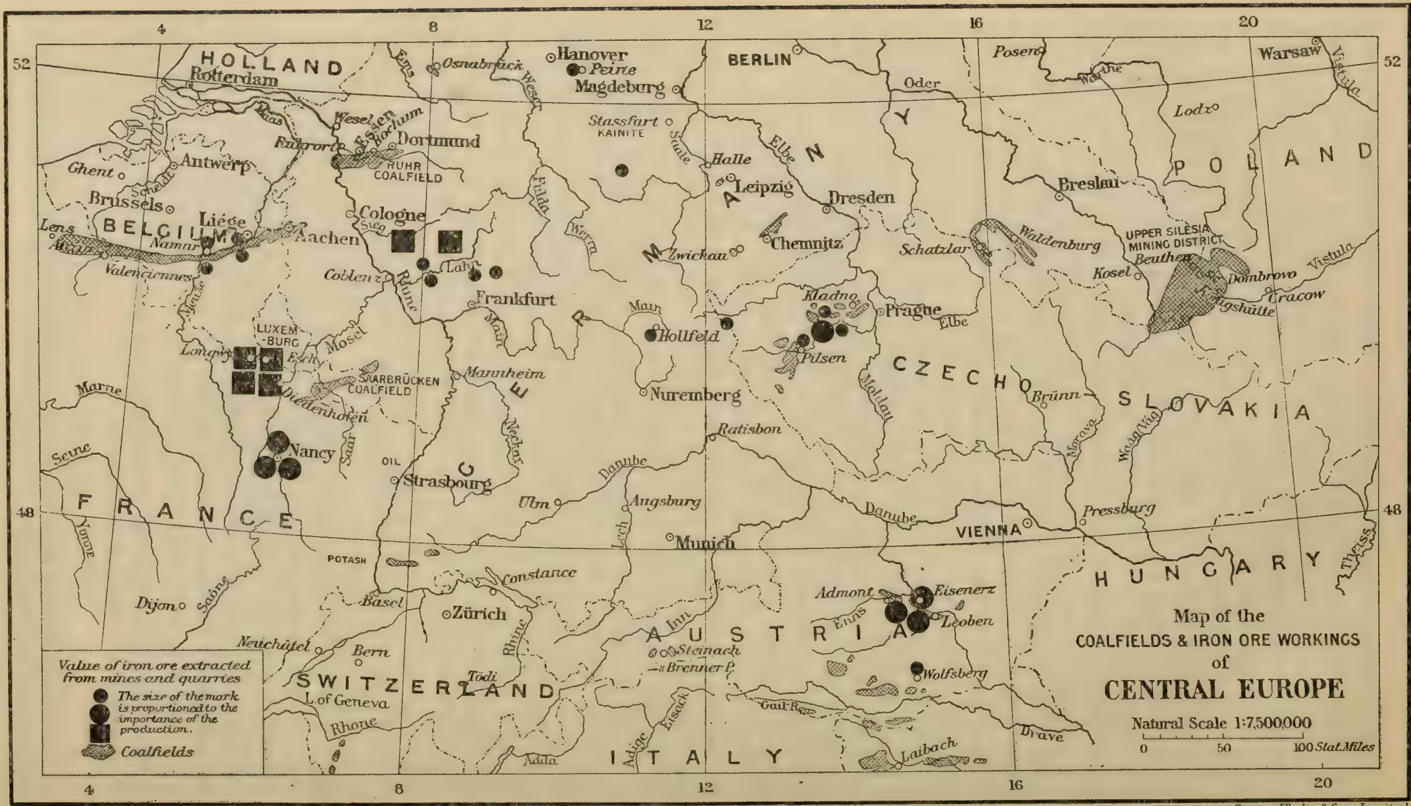
[4] See, however, par. **780**.

[5] Now almost entirely transferred to Poland (**862**).

[6] Said to be capable of producing the whole amount of fertilisers of this class required in Germany.

duction and their relative importance. Of the deposits to the east of the Rhine and north of the Lahn the most important are those of the valley of the Sieg, the Siegerland deposits which, though costly to mine, have a high iron content, 38 to 40 per cent., capable of being increased by calcining to 50 per cent., and are rich in manganese. But by far the greatest production of ores in Central Europe available for the German iron industry is that of the minette ores of Lorraine and Luxemburg, whose position is shown in the west of the map (no longer within the Customs Union—the Lorraine ores now entirely in France (**780**), and Luxemburg now in the French Customs Union). But these are so poor in iron and have such a high phosphorus content that they were little developed before the Thomas process (**535**) was introduced in 1879. A further stimulus was given to the production of these ores by the expiration of the Thomas patent in 1894. (Compare the diagram par. **540**). They are very cheap to mine, are so rich in lime as for the most part to need no addition of limestone, and are easily smelted on account of their great porosity. For the smelting of these ores coke had to be brought from the Ruhr basin, a distance of 200 to 215 miles, principally from Gelsenkirchen,[1] the chief coke-making centre in Germany. The trains, however, carried much ore back to feed the furnaces which abound on the coalfield. Even before the war the iron and steel industry of the Ruhr basin was becoming more and more dependent on imported ores from Sweden and Spain. The war has, of course, increased this need for foreign supplies. Since the war, however, a valuable deposit of ore containing 50 to 60 per cent. of iron and 20 to 30 per cent. of manganese has been discovered in the Iderwald south of Coblenz. The first coke blast-furnace in the Ruhr basin was set in blast in the early forties of the nineteenth century. Between the river Ruhr and the Emscher lies Essen, with the vast works of Krupp ; about 20 miles to the south lie Remscheid and Solingen, the chief seats of the making of cutlery and steel weapons in Germany. The narrow valley known as the Enneperstrasse (Enneper Road), beginning about seven miles north-east of Barmen and terminating at Hagen, is a continuous succession of ironworks and forges. Another important iron industry has existed for hundreds of years in Silesia on and near the coalfields, but some of the most important industrial seats of this area are now in Poland (**862, 863**). One result of the war, which has reduced so considerably the material advantages of Germany for the iron industry, has been that that country has been led to seek compensation for this by utilising her cheap highly-skilled labour to push her iron and steel manufactures more largely to the finished stage. As this tendency was already in progress before the war it may be looked upon as permanent.

[1] A town which first appeared among those above 100,000 after the census of 1905 through the incorporation of several smaller places.



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834. Zinc (**567**) and lead (**562**) are obtained in Silesia and the Rhine province, the latter also elsewhere, but the chief Silesian deposits are now in Poland. In the Rhine Province the chief zinc-producing centre is near Aachen, close to the zinc-producing district of Belgium (**802**). Copper is produced chiefly in the Harz, at Mansfeld (**561**), silver at Mansfeld and at Freiberg in Saxony.

835. The chief salt-producing district in Germany is in the Prussian province of Saxony, and among the salt-mines of this district, those of Stassfurt are of peculiar scientific interest as well as economical importance. Above an exceptionally pure deposit of rock-salt (containing 98 per cent. of chloride of sodium—**603**) there lies a bed of mixed 'potash salts'[1] found here for the first time free in nature. At first these potash salts were merely treated as waste products, but since 1860 they have been made the basis of various chemical industries, and have made Stassfurt the seat of a greater number of chemical factories than are probably to be found on an equal space anywhere else in the world. From the salts as they are found in nature are extracted carbonate of potash (**597, 605**), used in soap-making, dyeing, bleaching, glass-making, calico-printing, pigment-making, pottery, &c.; sulphate of potassium, used in an impure state under the name of kainite, which contains also a certain proportion of magnesium salts, as a fertiliser (**571·11**), and for other purposes; nitrate of potassium, for gunpowder-making, glass-making (**597**), pickling, &c.; various compounds used in photography, such as cyanide, bromide, and iodide of potassium, besides a great variety of other substances. At the neighbouring town of Schönebeck, on the Elbe, are the largest salt-works in Germany.

836. Numerous borings reaching potash salts have now been made in different parts of the province of Saxony and the adjoining parts of Brunswick, &c., and as no similar deposits on a commercial scale were known outside of Germany, this monopoly induced the Reichstag (1909) to pass a law controlling the trade—regulating the minimum annual production for the home market, the amount to be exported, and the price per unit of pure potash. Compare pars. **605, 780,** and **938.**

837. With the natural advantages enumerated in the preceding paragraphs it was to be expected that Germany would become a great manufacturing and commercial country. Many causes, however, retarded the development of its resources till about the seventies of last century; but the very fact that it was then so backward economically caused its advance to be all the more rapid when it began, especially when it received the stimulus from the payment of the indemnity of £200,000,000 after the war of 1870–71.[2] The growth of manufactures

[1] Export of pure potash in 1913, 506,000 metric tons; in 1919, 175,000.

[2] This state of matters obviously favoured the absorption of this indemnity without serious injury to herself.

has been mainly dependent on the development of the home market,[1] for which a protective policy was adopted in 1879, followed by an even more stringent tariff which came into operation on the first of March, 1906. The high degree of protection given to agriculture is a special feature of German tariff policy, and the table in par. **831** gives some indication of how German agriculture has increased both the labour supply of the country and the home market, and what is said in the same paragraph as to the concurrent expansion of the railway system will throw some light on the rapid growth of the German iron industry which had to meet large demands directly resulting from that expansion, but also still greater demands in consequence of the developments thereby brought about. It should also be noted that at the time when rapid industrial expansion began to take place Germany was already reaping the fruits of a highly organised educational system which it has spared no efforts to maintain at the highest level.

838. Among the **manufacturing industries** of Germany not directly depending on its agriculture and mining, the most important is that of woollens, and next to that silks and cottons. These and other branches of the textile industry have their chief seats on and near the great coalfields, the Ruhr basin especially being as thickly studded with manufacturing towns as Lancashire or the West Riding of Yorkshire. The adjoining towns of Barmen and Elberfeld[2] here carry on all branches of the textile industry, but above all woollens and silks, Barmen being specially noted for bindings, braids, and trimmings. Crefeld, west of the Rhine, is next after Lyons the most important place in Europe for the manufacture of silks and velvets, and, like Lyons, has the industry favoured by the excellence of the water for dyeing. (See also **349.**) Aachen (Aix-la-Chapelle), on a small detached coal and iron field to the south-west, is the chief seat of the manufacture of woollen (as distinguished from worsted—**327**) cloth in Germany.

839. Chemnitz, 'the Saxon Manchester,' a great seat of cotton and other textile industries, as well as of the manufacture of machinery, is the centre of the manufacturing region connected with the Saxon coalfield; and Breslau, Görlitz, and Liegnitz are the chief manufacturing towns of Silesia. Görlitz, which lies in one of the districts that acquired for Silesia so great a reputation for its wool (**315**), is specially noted for its woollen manufactures as well as its machinery. Hosiery flourishes chiefly in Saxony and Württemberg (Stuttgart, &c.), and Plauen in the extreme south-west of the kingdom of Saxony is the chief seat of German cotton embroidery (**871**).

840. Notwithstanding the influence of coal in localising textile as well as other industries, it is a noteworthy characteristic, both of the

[1] See Sombart, *Die deutsche Entwickelung im neunzehnten Jahrhundert,* Berlin, 1099, pp. 400 fgg.

[2] For populations of inland towns see p. 401.

cotton and the woollen industry in Germany, that they are much more widely scattered than in England. This difference is particularly striking in the case of cotton-spinning, the leading towns in which are distributed over a large part of Germany to the west of the Elbe,[1] some in places far from any coalfield, though the greater number are in Alsace and the Prussian Rhine Province. Except in yarns Germany now exports a greater value of every product of the cotton industry than it imports, but in spite of heavy duties[2] it still imports from England and elsewhere large quantities of cotton and woollen and worsted yarns, especially the finer qualities. In recent years Germany has almost entirely freed itself from its dependence on Liverpool for supplies of raw cotton. The great German cotton market and place of import of raw cotton is Bremen, the German port having greatest conveniences with respect to the principal towns engaged in the industry. A cotton exchange was established there at the end of 1872, and in 1886 this became a national institution through an arrangement concluded between it and an association of German cotton spinners.[3]

841. Down to nearly the end of the last century the weaving branch of the textile industries was to a large extent a domestic industry, employing hand-looms, especially in the silk industry and the linen industry of Silesia, and the change from domestic to factory labour was then taking place with great hardship to the hand-weavers. But a rapid change has been brought about in this respect. At the census of occupations in Germany in 1882 more than a fourth of those engaged in textile industries carried on their trade domestically, but at the census of 1895 nearly 90 per cent. of the textile employees worked in establishments employing more than five persons. Even yet, however, the organisation of labour for textile and some other industries is inferior in Germany to that which has been attained in Great Britain through the longer course of industrial development in the latter country, and the concentration of industry and greater subdivision of labour that have thus been brought about. Technical processes in Germany are still imperfectly specialised. The artisans may as a rule be individually fitted for a greater variety of work than those of England, but their labour in each department is less efficient than that of the

[1] In 1913, out of twenty-one places with more than 100,000 cotton spindles within the present German boundaries nine were in the part of Prussia west of the Elbe, six in Bavaria, five in the kingdom of Saxony, and one in Württemberg. Augsburg came first with nearly 675,000 spindles, Gronau on the western border of Westphalia close to the Dutch cotton manufacturing district second with 645,000.

[2] The duties on the finer woollen and worsted and cotton yarns under the new tariff which came into force on March 1, 1906, exceed in some cases 30*s.* per cwt.

[3] The import of raw cotton at Bremen increased from 158,000 bales (? of 500 lbs.) in 1870 to 1,567,000 bales in 1900. Specially low railway rates are fixed for the carriage of raw cotton from Bremen to the manufacturing centres. The export of raw cotton from Great Britain to Germany reached its maximum, 775,000 cwts., in 1887. In 1901 it had sunk to 47,000 cwts., but it has since risen. See Oppel, *Die Baumwolle* (Leipzig, 1902), pp. 1–6, 661–2.

English artisan, who is trained to perform particular operations with the utmost celerity consistent with exactness. To this cause is due in a large measure the inferior value, and hence the lower wages, of German as compared with English labour.[1] (Compare, however, **846.**)

842. On the other hand, attention may be called to two great industries in which the advanced state of German education has been an important contributory cause in bringing them to the high pitch which they have reached, the chemical and the electrical industries. Local causes favouring certain chemical industries have already been mentioned (**835**). But it is above all in the production of coal-tar dyes that Germany is pre-eminent. The most important step in the history of this industry was the artificial production of alizarin from anthracene by two German chemists in 1868, and since that date the technical production of dye-stuffs has been almost exclusively in German hands. In each of the large works engaged in this industry large numbers of chemists are constantly employed in making experiments and researches with a view to the continued progress of the industry. As these now carry on their industry on such a scale that they manufacture not only their own semi-raw materials, but also subsidiary products which are the special products of the heavy chemical industry, sulphuric acid, nitric acid, soda, caustic soda, &c., requiring large quantities of heavy raw materials, they are all situated on great waterways—at Ludwigshafen opposite Mannheim, seat of the celebrated Badische Anilinfabrik; Leverkusen, on the right bank of the Rhine below Cologne; Frankfurt and Höchst on the Main; Berlin. The electrical industries have developed chiefly since 1891, the year in which at an exhibition at Frankfurt-on-the-Main power was first transmitted electrically over considerable distances. The chief seats of the industry are Berlin and Nuremberg. For electric installations Germany has the advantage over this country of greater natural water powers, and in many cases the amount of such power has been increased by the formation of artificial lakes in valleys offering facilities for the erection of dams for this and other purposes. A lake thus formed in the Edertal in Waldeck has a capacity of about 6,200, one in the Mölmetal, an eastern tributary of the Ruhr in Westphalia, a capacity of about 4,200, and one in the Urfttal in the Eifel, a capacity of about 1,600 millions of cubic feet.

843. One of the most notable developments of German industry in recent years has been in shipbuilding and marine engineering. The progress of shipbuilding in Germany, which has advantages for the industry in some respects similar to those of the United Kingdom (**704**), along with special assistance in the form of reduced railway rates for shipbuilding materials, keeps pace with the growth of her shipping. The chief establishments are at Stettin, where the Vulcan Company

[1] In recent years there has been a great change, but this is still true of some branches of the textile industry.

has built some of the largest liners afloat, the Weser ports, Hamburg and Elmshorn (below Hamburg), Kiel, Lübeck, Rostock, and Flensburg. River-steamers are also built at Dresden and other river-ports.

844. Among other notable German manufacturing industries may be mentioned the clockmaking and toymaking of the Black Forest and Thuringia, mainly domestic industries of an agricultural population; the porcelain manufactures of Meissen, which has the royal factory of 'Dresden' china, of Zwickau, and Berlin; the making of pianos in Berlin, Stuttgart, Leipzig, and Dresden; and of scientific instruments in many university towns, but chiefly in Munich and Jena. The vast leather industry has its chief seats in the south, but it is also carried on to a large extent in Schleswig-Holstein and the Rhine provinces. The making of boots and shoes appears to be still carried on most largely in the out-of-the-way town of Pirmasens, in the upland district of the Hardt to the north of the Vosges. The United Kingdom is a large importer of uppers for boots and shoes and of saddlery from Germany.

845. The **foreign commerce** of Germany showed before the war a more noteworthy development than that of any other European country.[1] The circumstances already mentioned as favouring internal development in Germany go far to account for this, even if the German exports are to be regarded as a comparatively small overflow of production carried on mainly for the home market. But we may note also as favouring external commerce not only the increasing facilities for communication with the seaboard, but also that Germany is surrounded by some of the wealthiest countries of Europe, all, except Russia, having railways on the same gauge, and that through the Alpine

[1] The figures in the tables of exports and imports in the Appendix show some very remarkable features, some of which correspond in a striking manner with certain features of British trade. In the first two periods there was a great excess of imports over exports. In the third these were brought almost to an equality. In the subsequent periods there has been, as in the United Kingdom, a progressive increase in the excess of imports over exports. For three periods in succession 1881–85 to 1891–95 the value of the exports was nearly stationary, and it is noteworthy that the slight decline in 1891–95 was in spite of the fact that that is the first period in which the trade of Hamburg and Bremen was included in every year of the period (**819**). In 1896–1900, and again in 1906–10, there was a great expansion in the value of the exports, just as in the United Kingdom. Another striking correspondence with the British trade is to be found in the fact that the exports which in recent periods have shown a relative growth are not the products of the great textile industries (woollen, cotton, silk), which have long been important in Germany, nor pig and unwrought iron, the first products of an industry which has been expanding with great rapidity in Germany, but above all machinery, and that coal has shown a steady rise in percentage though not nearly so rapid. The steady rise in the proportion of leather, but not of leather wares, may also be noted, as likewise the fact that a relative decline in the value of the sugar export had begun even before the abolition of bounties in 1903. On the import side attention may be called to the steady rise in the import of coal, to the large import of grain and the much more rapidly rising import of eggs, as well as to the fact that the percentage value of the import of yarns is steadily declining. See also the notes on the table.

tunnels this advantage, at least for commodities of relatively high value, is continued into Italy.[1] Still, the greater part of German commerce is carried on by sea, and, as in the British Isles, there is a rapidly growing amount of trade in bulky articles. In Germany, however, the preponderance of bulky articles in the sea-borne trade is on the import side—coal, ores, grain, petroleum, fertilisers. Germany's large import of timber is mainly from, and that of coal mainly to, countries on her land frontier, and probably her bulkiest exports by sea are those which come under the head of iron and steel wares. This state of things can hardly but be favourable to outward sea-freights, and no doubt contributes largely to the explanation of the fact that the German export of cotton manufactures has come to be second to our own (377).

846. None of these causes of the development of German commerce is of a nature which this country could have prevented, or which it would have been the interest of this country to prevent if it could. The advantages which Germany derives from the development of native resources and improved communications abroad are of a kind that must be shared directly or indirectly by all countries with which Germany has dealings.[2]

847. For the despatch and reception of its transmarine exports and imports Germany is largely dependent on foreign ports—those of Belgium, Holland, and France, Italy and Austria. None of its own **seaports** is so conveniently situated for the commerce of the chief mining and manufacturing region of the west as Antwerp or Rotterdam. There are very few German seaports with a sufficient depth of water for ships of the largest size. Down to the last decade of the nineteenth century the only two with a depth of more than 25 feet were those of Bremerhaven, the outport of Bremen, on the Weser, with the adjoining Prussian port of Geestemünde, and Cuxhaven, the outport of Hamburg; but since then Hamburg, Bremen, and Emden, all North Sea ports, have been added to the number. The basins at Hamburg now have a depth at mean tide up to $23\frac{1}{4}$ feet, and the rise of the tide adds from 3 to 5 feet. Below Hamburg, however, a bar beginning at Blankenese extends to Brunshausen, 21 miles below the town, and the deepening operations so far carried on have not yet

[1] The special importance of the St. Gothard tunnel to Germany may be seen from one example. In 1880, before the opening of the St. Gothard tunnel, the quantity of iron and steel in plates and bars of 5 millimetres (0·2 inch) or more in thickness imported into Italy from the United Kingdom was nearly 60 per cent. of the total under this head (the largest under the general head of iron and steel), that from Germany 2 per cent. In 1890 the proportion derived from the United Kingdom was less than 22 per cent., that from Germany more than 52 per cent.; and more than nine-tenths of Germany's share was introduced by land.

[2] From the table in the Appendix showing the destination of British exports, it will be seen that Germany ranked next after India as a market for British produce and manufactures. In 1913 the leading exports from the United Kingdom to Germany were yarns of all kinds (nearly 7·4 millions), coal (nearly 5·4 millions), and machinery.

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sufficed to enable ships of the full size admitted by the Suez Canal to ascend to the docks except at high water, and the large American liners, drawing when laden upwards of 30 feet, never ascend above Brunshausen. The port, however, has the advantage of being comparatively free from fog, and by means of ice-breakers it is now kept always open. At Cuxhaven the depth at low water is 26½ feet. In the tidal basin which forms the free-port of Bremen the depth at low water is 26¼ feet, and here also the channel is always kept free from ice. At Bremerhaven the depth is as much as 35 feet. Bremen proper was long a seaport without ships, since even small sea-going vessels ascended the Weser no higher than Vegesack, about ten miles below Bremen. At Emden the depth at ordinary high water is 33 feet. Swinemünde, the outport of Stettin on the Oder, has a depth of 24 feet.

848. The principal other German seaports are the Baltic ports of Lübeck and Travemünde, on the inlet that receives the river Trave, Rostock on the Warnow, Stralsund, opposite the island of Rügen, Anklam on the Peene, Stettin, Königsberg on the Pregel. These have a mean depth of from 15 feet (Stralsund) to about 23 feet (Stettin).[1] Between the mouth of the Oder and Danzig, on a coastline of about 250 miles, there is no seaport of any consequence. Kiel [2] is an important station of the German navy, and Wilhelmshaven on the Jahde, west of the mouth of the Weser, is used solely for this purpose.

849. Of all the German seaports, by far the most important at the present day is Hamburg, including Cuxhaven. Like Liverpool, however, Hamburg has risen to a dominant position among seaports only in comparatively recent times. English and Dutch settlers, after the discovery of the sea-way to the East, first made it an active scene of shipping, but the chief impetus to the development of its trade was given only in the eighteenth century, when the American war of independence opened it to various colonial ports. With the development of American and other trans-oceanic commerce that has since taken place, Hamburg has steadily risen in population, wealth, and commerce, its admirable water-communications upwards as well as downwards greatly favouring its growth. The only bridges across the Elbe here are at the upper end of the city, but a tunnel for passengers and vehicles lower down was opened in 1911. Altona,[3] the Prussian seaport immediately adjoining Hamburg, has a similar trade.

850. Bremen, with its outport of Bremerhaven, is the only other German seaport with a large American and trans-oceanic commerce. Lübeck, before the commencement of trans-oceanic commerce the most important of all German seaports, began to decline in the fifteenth

[1] It is now proposed to increase the depth at Stettin to 24¼ feet.
[2] Harbour depth, 40 feet; alongside quays, 20 feet.
[3] Harbour depth spring-tides up to 26 feet.

Hamburg	931,000	Kiel	210,000
Hamburg-Altona	1,150,000	Lübeck	115,000
Bremen	260,000		

century, and only recently has begun to show any revival. During the fourteenth century one of its rivals was Wismar, on the coast to the east, but this port has sunk into complete insignificance, and its commerce has passed to the still more easterly port of Rostock. Stettin derives a good deal of its importance from its being the nearest seaport to Berlin, as well as from its connections with the populous region of Upper Silesia. The eastern port of Königsberg has a large export trade in timber, grain, flax, hemp, potatoes, and other agricultural products.

851. The difference in the relative importance of German seaports in former times and now is partly due without doubt to political causes, but it is possible also to recognise geographical causes as powerfully operating at the same time. In trying to account for the predominance of Lübeck in the middle ages one must first notice that the narrowness of the Baltic Sea and the number of islands within it favoured the rise of shipping in the infancy of navigation. Short voyages brought a greater number of ports into communication with each other than on the North Sea, more particularly the German shores of the North Sea. The difficulty of communication by land contributed here as elsewhere to the rise of numerous ports, each having for the most part a small hinderland except where they stood at the mouth of a great navigable river, and generally the importance of a seaport was in direct relation to the importance of the waterway which enlarged its hinderland. In early times *Julin*, close to the site of the modern Wollin, was an important port at the mouth of the Oder, and it is noteworthy that being a Slavonic town it stood on that mouth of the Oder which is turned towards the Slavonic east. When it was destroyed by the Danes in 1177, the Teutonic town of Stettin, already several centuries old, promptly took its place, and has held that place ever since. Danzig and Elbing were in the middle ages equally accessible ports at the mouth of the Vistula and were rivals for the trade of that river; Königsberg had a corresponding importance as the outlet of the Pregel. None of the ports of this region, however, had any great consequence till order was established there by the knights of the Teutonic order in the period after 1230. Elbing and Königsberg were both foundations by that order, and though Danzig is a much older town it did not attain prosperity till after it was purchased by that order in 1309. Lübeck, the most important of all the Baltic ports and indeed of all German ports in the middle ages, is an obvious exception to the general rule above stated as mostly determining the relative importance of seaports. Its river is comparatively insignificant. But it is to be noted that there was a very important trade in western Germany, including the transalpine trade in the valuable products which had to be brought into connection with the Baltic ports in the aggregate, and manifestly no other port is so conveniently

Stettin . . .	230,000	Königsberg . .	260,000

situated for that purpose as Lübeck. This was so even before there was any waterway from Lübeck to the Elbe, a fact clearly indicated by a significant exception in the privileges conferred by Henry the Lion on Lübeck in 1167. Lübeck was then granted among other things exemption from all tolls and customs in Henry's duchy of Saxony except at Artlenburg. Artlenburg is situated on the left bank of the Elbe at a point nearly due south of Lübeck, and nearly opposite the southern end of the subsequent Stecknitz and the present Elbe-Trave Canal. It is fair to surmise that already in 1167 the dues collected there were too valuable to forego, which implies that the trade across the Elbe at this point was by this time important. One large item in that trade in the twelfth and subsequent centuries was Lüneburg salt, a very valuable commodity when salt fish and salt meats formed a much larger proportion of the food of the people than now. But Lüneburg was only one station on a land route leading south-westwards along the base of the German highlands, and tapping the trade also of the Weser and the Rhine. Important mediæval remains, not only at Lüneburg, but also at Hanover, Minden, Osnabrück, and Münster still bear witness to the former importance of this route, by means of which the valleys of the Elbe, Weser, and Rhine were all brought within the hinderland of Lübeck in relation to the Baltic trade. This hinderland was made much more accessible when Lübeck merchants constructed the Stecknitz Canal in 1390–98, and even at the present day the importance of the relations of the Baltic as a whole through Lübeck with western and south-western Germany is shown by the immediate success of the Elbe-Trave Canal, adapted for ships up to 800 tons burden [1] (depth $8\frac{1}{6}$ feet), which was opened in 1900, and now takes the place of the Stecknitz Canal. The opening of the canal has developed a large trade between the upper Elbe and the Baltic, especially the eastern Baltic ports.[2] (See the map of German hinderlands, pp. 96–7.)

852. When trans-oceanic shipping came to surpass in importance that of the Baltic [3] the advantages of Hamburg were just as decisive as those of Lübeck had been formerly. The Elbe and its tributaries gave access to central and southern Germany as well as Bohemia, and the construction of the short Friedrich Wilhelm Canal connecting the Spree with the Oder, as far back as 1662–68, brought the upper Oder also within the hinderland of Hamburg, at least in relation to trans-oceanic shipping. Subsequent improvements have enhanced these advantages. Since 1897 vessels of 400 tons have been able to ascend past Breslau to Kosel, the port of the coal and zinc-mining region of

[1] Vessels of this size can ascend the Elbe as high as Aussig, the chief lignite river-port of Bohemia, about 400 miles above Hamburg.

[2] From this cause the shipping of Lübeck in 1902 (a year of depression in the German shipping trade generally) was twice that of 1901.

[3] Of the total tonnage of German shipping in 1830, 64·5 per cent. belonged to the Baltic, 35·5 per cent. to the North Sea; in 1910 only 10·6 per cent. belonged to the Baltic, 89·4 per cent. to the North Sea.

Upper Silesia. As the waterways had to a large extent determined the importance of German towns before railways were introduced, the railways have been made to follow the lines of the chief waterways, and thus to confirm the connections already established. Additional importance was of course given to Hamburg by the development of the coal, lignite, and other mines which have helped to maintain and expand the manufacturing industries of Saxony and Bohemia. Bremen has not nearly so extensive a hinderland as Hamburg, but it has the advantage of being nearer America, a matter of importance for passenger traffic,[1] and nearer the coalfield of the Ruhr basin, a matter of great importance so long as political considerations lead to the diversion of a large part of the trade of that region from its natural ports of Rotterdam and Antwerp.

853. During the middle ages the commerce of Germany was greatly promoted by the Hanseatic League, a confederacy which at the time of its greatest extension and influence embraced nearly all the sea- and river-ports of modern Germany and the Netherlands up to Cologne on the Rhine, Magdeburg and Halle on the Elbe and Saale, Frankfurt on the Oder, and Thorn on the Vistula. At what date it was founded is uncertain, but before the close of the thirteenth century it was powerful enough to check the disorders to which its rise was due, piracy at sea, and the rapacity of the numerous petty princes and ecclesiastical dignitaries among whom Germany was at that time divided, the authority of the German emperors being then little more than nominal. The armed forces which it maintained, especially at sea, procured respect for it, and powerfully contributed towards the acquisition of privileges which at sundry times it obtained in foreign countries. Its internal organisation varied at different times. At one time it formed three great divisions, one with Lübeck, one with Wisby on Gothland, and one with Cologne at the head. At another time (after 1367) there were four great groups under the presidency of Lübeck, Cologne, Brunswick, and Danzig respectively. At all

[1] For passenger trans-Atlantic traffic both Bremen and Hamburg have obvious advantages over the English ports, each having a much more populous hinderland to draw upon and both being able to tap hinderlands of the English channel at Southampton or Plymouth, and Boulogne or Cherbourg. The figures below give the number of passengers carried to New York by the North German Lloyd (Bremen), the Hamburg-American Company, and the only two English companies carrying as many as 15,000 steerage passengers in 1901. These figures refer solely to the traffic from northern ports, and do not include passengers carried by the Mediterranean services of the two German companies.

—	North German Lloyd	Hamburg-American	White Star	Cunard
Cabin . .	20,403	20,524	18,167	17,783
Steerage .	76,804	63,223	30,483	19,943
Total .	97,207	83,747	48,650	37,726

times, however, Lübeck had the chief place, a natural consequence of the circumstances mentioned in par. **851**. There the diet met, and there the archives of the confederacy were kept. Abroad the confederacy had four great factories—at Bruges, London, Bergen, and Novgorod (on the Volkhov). The confederacy began to decline in importance in the sixteenth century, when the German emperors recovered some of their power, and England, Scandinavia, and Russia had also become more powerful. It finally sank into complete insignificance during the Thirty Years' War (1618–48), which had such a prolonged disastrous effect on Germany generally.

854. All the Baltic ports are subject to the inconvenience of being closed by ice in winter, and the interruption of traffic from this cause is of course (**55**) longer the further east the port lies.

855. The following are the chief inland towns of Germany in the order of their population, given in thousands :—

	Year 1910	1919		Year 1910	1919
Greater Berlin	3,700	3,230	Stuttgart	290	310
Berlin-Charlottenburg	2,400	2,225	Magdeburg	280	285
Munich	600	630	Neu Köln	235	260
Leipzig	590	605	Duisburg	230	245
Dresden	550	530	Dortmund	215	295
Cologne (Köln)	515	635	Mannheim	200	250
Breslau	510	530	Gelsenkirchen	170	170
Frankfurt-on-the-Main	415	435	Aachen	155	145
Hanover-Linden	375	390	Cassel	150	160
Düsseldorf	360	410	Brunswick	145	140
Elberfeld-Barmen	340	315	Bochum	135	140
Nuremberg (Nürnberg)	335	350	Karlsruhe	135	135
Essen	300	440	Crefeld	130	125
Chemnitz	290	300			

Of these towns, Munich, Dresden, Stuttgart, and Brunswick, besides Berlin, owe much of their importance to their still being local capitals. Frankfurt-on-the-Main, moreover, was at one time in a sense the capital of Germany, and Hanover the capital of a separate kingdom. It is chiefly to its rank as capital, together with its central position in the German plain, that Berlin, which is a town of comparatively modern growth, owes its commercial importance. Like other large capitals, it is the seat of many industries (the making of machinery of all kinds being that for which it is most noted), and since the establishment of the German Empire it has become the centre of banking and exchange in succession to Frankfurt-on-the-Main.

856. Local conditions have made Breslau an important centre of commerce from an early period. It arose at the only convenient crossing-place of the Oder for a considerable distance up and down (**194**), and as far back as the twelfth century it is mentioned (under the name of Wratislaw) as the chief city of Silesia. For seven centuries it has been the place where the industrial products of the West have been exchanged for the agricultural products of the East, and the commerce of this nature has been greatly increased by the modern

developments of industry in consequence of the existence of two coalfields as well as other mineral deposits in the vicinity. It has hence become the place of convergence of all the south-eastern railways. (See map, p. 412.) Six per cent. of the inhabitants are Jews.

857. Munich, though situated on an inhospitable plateau, was already the capital of a Bavarian duchy in 1255, but only grew into importance after Bavaria became a considerable state, about the beginning of the nineteenth century. The size which it had already attained at the time of the introduction of railways naturally caused it to be selected as a railway centre, and the commercial advantages which it derives from that circumstance are all the greater from the fact of its being the most convenient place of division of the commerce which passes across the Alps by way of the Brenner. One important line of railway proceeds from Munich north-westwards by way of Augsburg and Frankfurt to the most populous region of the Rhine basin; another northwards to Saxony and Berlin by way of the Naab valley (which in earlier times helped to give a now lost importance to Regensburg or Ratisbon on the Danube); a third north-eastwards to Prague. It has hence to a large extent superseded not only Augsburg, but also Regensburg and Ulm. Modern commercial routes pass through the latter places without conferring on them any special importance.

858. Of the other inland towns mentioned above, and not already particularly noticed, that which is of most interest on commercial grounds is Nuremberg, and the interest in this case arises from the fact of its being an old industrial town whose manufacturing industry was chiefly maintained in earlier periods by its favourable situation for trade. It lies in a basin surrounded by hills, through which, however, there are openings in all directions which have made it a natural point of concourse for all south-west Germany. Other natural advantages, on the other hand, it lacked. Special privileges were granted to it by the Emperor Frederick II. in 1219, expressly because it had neither vineyards nor shipping and lay upon the most sterile soil (' auf rauhestem Boden '). In the middle ages it was the chief manufacturing town in Germany, and though in modern times it has been eclipsed by other manufacturing towns with greater advantages according to modern requirements, it has never lost the stamp of an industrial and commercial city. The characteristic manufactures of the place are such as might be expected from its history and position, being those which demand little material and little expenditure of mechanical power, but much skill on the part of the workmen. Besides the making of toys, material for which is supplied by neighbouring forests, and pencils made with graphite (**571·14**) from Passau and elsewhere, various kinds of artistic metal-work and the manufacture on a large scale of electrical apparatus furnish the chief employment of the industrial population. The early importance of the town is

indicated by its having long been known in England under an English form of name.

859. In the middle ages, when transalpine commerce had a high degree of relative importance, Ratisbon, Nuremberg, Augsburg, Ulm, and Frankfurt all reached a high degree of prosperity in connection with that trade. Ratisbon owed its commercial, and hence also a high degree of political, importance to its connections with the traffic on the Danube and that across the Brenner, the entrance to which route is made where the Inn valley emerges on the high plains of Bavaria immediately to the south. When Constantinople was the capital of a Christian empire and as such the focus of a great trade in valuable commodities, one of the routes leading from it was that of the Danube to the heart of Europe. At Ratisbon goods would leave the river for the Elbe basin and for Frankfurt and the gorge of the Rhine, or join the river from those directions, and for all these reasons it was a highly important focus. Nuremberg stands directly on the route from Ratisbon to Frankfurt, and without doubt this circumstance would contribute to its early commercial and industrial development. Ulm, the head of the Danube navigation, lies at a point where an easy route leads across the Black Forest to the middle Rhine valley, and almost due north of the opening, through the upper Rhine valley, at the head of Lake Constance, of many pass-routes leading across the Alps. Augsburg again was at the fork of the roads leading on the one hand to the Rhine valley passes just referred to, on the other hand across the Seefeld Pass to Innsbruck and so to the Brenner. The surviving palace of the celebrated Augsburg house of the Fuggers at Trent on the latter route (**875**) is a notable witness to the importance of the Augsburg connections of former days in this direction.[1] In addition to the advantage of situation above indicated, Frankfurt served to connect the valley of the middle Rhine with the Weser and Elbe valleys and Lübeck, and the importance of these relations is still illustrated by the railway connections of the city.

860. In paragraph **847** it is pointed out that a large part of the foreign trade of Germany is carried on through Dutch, Belgian, and other ports. The extent to which it is so has been revealed, in the case of the exports from Germany to Great Britain, by the issue in recent years of the returns relating to the consignment trade of the United Kingdom (see p. 705), which revealed the high proportion of German goods reaching this country through non-German ports.[2]

[1] A railway connection between Innsbruck and Augsburg by this route was begun before the war. It will have only a single track, and will have many sharp curves and gradients up to 1 in 28·5 (3½ per cent.).

[2] In 1912 the value of German consignments that came to Great Britain direct from German ports was £36·81 out of a total of £70·05 millions or 54 per cent. Of the remainder 33 per cent. passed through Dutch and 13 per cent. through Belgian ports—a clear proof of the greater importance of Rotterdam and Flushing than Antwerp and Ostend to Germany in respect of its British trade. About one-half per cent. reached us through French ports.

2. DANZIG

861. The Free City of Danzig,[1] embracing the old German port of that name (**851, 853**) together with the fertile and densely peopled delta of the Vistula, besides a small area on the west and half the Frisches Haff on the east, was created by the Treaty of Versailles. It carries on a trade similar to that of Königsberg, and the provisions of the treaty under which it was founded, giving large rights within it to the new republic of Poland, are such as to ensure its continuing to be what it has always been, the main outlet and inlet for the Vistula basin.[2] It is within the Polish customs union.

3. POLAND

862. The present republic of Poland, embracing by far the greater part of the basin of the Vistula, was created by the Treaty of Versailles and comprises all the areas inhabited wholly or mainly by people of Polish speech belonging to Russia, Austria, and Prussia since the partitions of the former kingdom of Poland at the close of the eighteenth century. Of the former Russian empire it includes the Polish provinces with the addition of a district round Grodno, of Prussia the greater part of the provinces of Posen and West Prussia, of the former Austrian territory the north-western part of Galicia, thus extending in the south to the Carpathians from the neighbourhood of Przemysl westwards. Apart from these mountains the surface is for the most part composed of low plains. The principal exceptions are one in the north-west where part of the Baltic lake plateau is now in Poland, and one in the south-east where the ridge of the Lysa Gora rises to the height of 2,000 feet to the east of Kielce. The whole area contains a large proportion of arable land, but this is especially true of the middle latitudes, where wheat, rye, and sugar-beet are largely cultivated. An extensive area round Posen on both sides of the Warta, but chiefly to the south, has more than sixty per cent. of the surface under the plough. The north-west, however, has considerable tracts of poor land under coniferous forest. The south-west is important for its mines of coal, iron, zinc, silver-lead, and salt, and the south-east has rich oil wells. In pre-war Poland the coal-mines were found near the south-west frontier round Dombrovo, but an enormous addition to the coal resources of the new

[1] Approximate area, 750 sq. miles; population, 350,000.
[2] See the *Geographical Journal*, April 1920.

Danzig (city proper, German census 1910), 170,000

state was made when the Council of the League of Nations in October 1921, awarded it the greater part of the Upper Silesian coalfield, which in 1913 produced nearly one-fourth of the coal raised in Germany. To the northern part of this transferred area belong also the zinc (calamine) and silver-lead deposits of the new Poland.[1] The iron deposits, which are of minor importance, are in or near the Dombrovo coalfield, as well as scattered among the other deposits of the transferred area, partly, also, along with copper, in the Lysa Gora. The salt-mines are those of western Galicia—Wieliczka and Bochnia to the west of Cracow; and the oil wells belong to the eastern part of this province, the principal being those of Drohobycz, which belong to the State.

863. Besides raw produce, Poland turns out large quantities of manufactured goods. Its extensive forests not merely furnish timber, but also supply the material for the manufacture of paper pulp and paper. A variety of manufactures are carried on at its two chief Vistula towns of Warsaw, the present capital, and Cracow, a much earlier capital, as well as Posen. But the chief seat of manufactures, especially of textiles, is Łodz, situated west-south-west of Warsaw. This town has grown with remarkable rapidity. The whole textile industry of Poland was due to a series of Government decrees of the years 1816 to 1833, which had the effect of settling there a number of German, principally Saxon and Silesian, artisans and industrialists, and the growth of Łodz is the result of these settlements. It is difficult to find any local advantages on the spot. Till shortly before the war none of the great through lines of railway passed through it. It is 88 miles from Warsaw, and 22 miles by rail from the junction on the Warsaw-Vienna line, which is on a different gauge; so that though this line passes through the Dombrovo coalfield, the procuring of coal thence, a distance of about 140 miles, involves a break of bulk.[2] The area transferred from Upper Silesia includes the important industrial towns of Königshütte, Kattowitz, and Tarnowitz, all with iron blast furnaces, the first two also with extensive zinc works, and the third, Tarnowitz, with silver-lead refineries. They are all within easy reach of good coking coal.

[1] The award was accompanied by sundry recommendations designed to promote the satisfactory working of the industries of the region in spite of the political partition, and there seems to be some prospect of those recommendations being harmoniously acted on.

[2] Nevertheless the number of cotton spindles here in 1913 was well on to a million, much greater than at any single place in Germany.

Warsaw (1907)	870,000	Cracow	510,000
Łodz (1910)	415,000	Königshütte (1919)	75,000
Łwow (Lemberg)	210,000		

THE ALPINE STATES

Switzerland, Austria

864. The two states mentioned embrace the greater part of central Europe covered by the Alps, although neither of them is confined to the area so occupied. An important feature of both, however, is that they are traversed by the ancient routes, now in some cases followed by railways, connecting the most densely peopled areas of north central Europe with the most populous of the Mediterranean peninsulas.

1. SWITZERLAND

865. From a commercial point of view this little country is in some respects very remarkable. With little coal and little iron, it is pre-eminently a manufacturing country in the modern sense of the term, manufactured articles forming the bulk of its exports, raw materials and food supplying the bulk of its imports. Situated in the heart of Europe, it sends its silks and cottons and its watches to the United States, Canada, and South America, the British and Dutch East Indies, China, Japan, and Australia. Even to the United Kingdom it has managed in recent years to export cotton manufactures (chiefly embroideries of one kind or another) to the value of more than two millions sterling.

866. A land of mountains, a land in which five-sevenths of the surface is divided between the Alps and the Jura, it has a population as dense, on the whole, as that of Ireland, and there is not a single district in the most mountainous canton in which the density of population is as low as in the county of Sutherland.

867. The nature of the surface presents great obstacles to internal communication between the populous midland tracts and various parts of the more sparsely-peopled region, and also to communication with the frontier countries in the east and south. Not till the nineteenth century was there any carriage-road across the Alps, but now the Swiss Alps possess some of the finest mountain roads in the world. The first constructed was that made by Napoleon across the Simplon for the passage of his 'cannon' from the valley of the upper Rhone to

the banks of Lake Maggiore in Italy. This was completed in 1805, and by the year 1830 the road across the St. Gothard between the valleys of the Reuss and Ticino, and those across the Bernardino, Splügen, Maloja, and Julier passes had been added (see map, pp. 396–397). Of those subsequently constructed, the most important perhaps are the Albula and Bernina pass-roads. The St. Gothard road, for a long time the most important of all on account of the direct communication which it establishes between the most populous parts of Italy (with Milan as the chief centre), Switzerland, and Germany, has now been almost entirely superseded by the railway which pierces the St. Gothard group in a tunnel nearly ten miles in length (completed in 1882). By means of this railway the continental ports on the North Sea have been brought to within a distance of three days for goods traffic from ports on the Mediterranean. The Bernardino, Splügen, Julier, Albula, and Maloja passes all serve to bring the Rhine valley by way of Coire into connection with Milan, the first by way of a tributary valley of the Ticino, the others by way of Chiavenna (the 'key town,' from Latin *clavis*, a key), the east side of Lake Como and the bridge of Lecco ; but the Splügen is the only one that leads direct to Chiavenna, the Julier and Albula leading first into the Engadine across the Maloja and thence to that town. Till 1903 the St. Gothard was the only one of the great Alpine tunnels (**823**) constructed within Swiss territory, but in that year a tunnel, $4\frac{1}{3}$ miles long, under the Albula pass, leading from Coire to the Engadine, was opened ; and another $12\frac{1}{4}$ miles long, under the Simplon (Brig to Iselle), was opened for general traffic on June 1, 1906.[1] The Simplon tunnel has much easier gradients in its approaches than either the St. Gothard or the Mount Cenis tunnel. Its highest point is only about 2,300 feet above sea-level, or 1,070 feet above the Lake of Geneva, while the summit of the St. Gothard tunnel is 3,785 feet above sea-level (2,350 feet above the Lake of Lucerne). It reduces the distance between Milan and Paris to 519 miles as compared with 559 miles by the St. Gothard route. The Lötschberg tunnel, 9 miles long, through the Bernese Alps connecting the Lötschental, which opens on the Rhone valley a little below Brig, with the Kandertal and Thun, completed in 1913, has greatly shortened the Simplon route to the north of France. In order to facilitate the communication with Basel and the Rhine valley for both the St. Gothard and Simplon routes a tunnel, opened in July 1914, has been pierced at base level through the Hauenstein to the north-west of Olten, to replace a previous tunnel at a higher level. The Albula tunnel is adapted only for a narrow gauge line, partly on the tooth-wheel principle. See also **631, 637.**

868. The **climate** of the Swiss midlands allows of the same **crops** being grown as in the adjoining parts of France and Germany. **Wine** is produced most abundantly and best in quality in the south-west

[1] A second Simplon tunnel, begun in 1912, was opened Dec. 4, 1921.

(Vaud and Neuchâtel). On the whole, however, the moistness of the climate, due to the mountainous character of the country together with the exposure to moisture-bearing winds on both slopes of the mountains, causes Switzerland to be better adapted for pasture-grasses than for the growing of food-crops, wine, and fruits. Of the total area, exclusive of waste land and forests, about 70 per cent. is used for cattle-rearing, less than 20 per cent. for the growing of cereals, less than 10 per cent. for potatoes, mangolds, and industrial plants, and only about 1 per cent. is under the vine. Hence among the industries of this class, cattle-rearing alone yields a considerable surplus for export. Besides cheese and condensed milk there is a large export of breeding stock belonging to races of cattle for which Switzerland has a high reputation as well as of cattle for fattening, but this is balanced by a large import of fat cattle chiefly from Italy and Austria. When one takes into consideration the requirements of the large manufacturing population, as well as that arising from the attractions of Switzerland as a holiday resort, it will be seen that the country must be dependent to a large extent on imported cereals. Nearly half of this import is derived from Russia either by way of Marseilles and Geneva or Genoa and the St. Gothard, the remainder from North and South America, and to a small extent from adjacent European countries. Among mineral products, asphalt (**557**) and hydraulic lime are the only ones of importance for export. Salt is worked at Bex in that part of the canton of Vaud above the Lake of Geneva. A trifling quantity of iron ore is worked in the Jura (at Délémont or Delsberg). Another deposit estimated to contain 7½ million tons has been discovered nearer Basel in the Fricktal.

869. For the prosecution of its **manufacturing industries** and handicrafts Switzerland, though suffering from the disadvantages above indicated, has certain advantages of its own, the principal being the abundance of water-power and of cheap skilled labour, to keep up the quality of which the government has done so much in the way of providing for efficient technical education (**36**). To these may be added the advantageous commercial position of Switzerland, more particularly of northern Switzerland, which lies at the intersection of the great routes connecting northern Italy with the middle Rhine valley and the lower Rhone valley with that of the upper Danube; but this advantage is diminished by the smallness of the home market. Now that production on a large scale is of so great economic importance, it is adverse to Swiss industries that a customs barrier is encountered on all sides within so short a radius. The Swiss have taken a leading part in the development of their **water-power**[1] by means of electricity (at Geneva,

[1] In 1918 the amount of potentially available water-power in Switzerland was estimated at 4,000,000 horse-power (French), of which about one-fifth was utilised in January 1921. A scheme for developing 200,000 h.p. by the erection of a dam 300 feet high across the gorge of the Reuss at Göschenen would result in the complete submergence of the Vale of Urseren with its three villages of Andermatt, Hospenthal and Realp.

on the falls and rapids of the Rhine between the Lake of Constance and Basel at Schaffhausen, Neuhausen and Rheinfelden, at Brugg on the Aar and Baden on the Limmat, at Bern and elsewhere). The manufactures and handicrafts in which Switzerland particularly excels are those in which the value of the labour, or the whole cost of elaborating the raw material, is high in proportion to that of the material itself, so that the cheapness of Swiss skilled labour tells all the more proportionally in the final value of the product. The great height to which the Swiss machine industry has attained may be taken as evidence of the excellence of the great polytechnical institute at Zürich. Every branch of the industry is carried on, but more particularly the manufacture of textile machinery, electrical machinery (at Oerlikon near Zürich and Baden), and hydraulic machinery.[1] All the leading places engaged in this industry are in the commercially favoured northern district above indicated.

The success of this country in the silk industry has been largely owing to the dexterity with which cheaper materials, principally cotton, have been worked up along with the more costly silk, which, moreover, is one of the raw materials the supply of which has been greatly cheapened through the construction of the St. Gothard railway leading direct to the great silk market of Italy. In cotton-spinning, Switzerland produces a greater quantity of fine yarn in proportion to the number of its spindles than any other country except England, and the cotton fabrics for which it is chiefly celebrated are trimmings and embroideries. Swiss shoes, which are exported even to the Argentine Republic, are not the commoner sorts, but noted for their quality and finish combined with cheapness. A great shoe factory, said to be the largest in Europe, has been erected at Schœnenwerd, a little to the north-east of Olten—a situation probably selected on account of the great facilities for despatch in all directions presented at that important railway centre (**867**).

870. The central situation of Switzerland is one of the facts that have caused this country to be selected for the seat of several semi-official international bureaux of great importance for commerce and industry, viz. the United Telegraph Administration, the International Postal Union, the Railway Administration, the headquarters of the League of Nations, the unions for the protection of trade marks and patents and of literary and artistic property, and the International Labour Office.

871. The chief centres of the silk industries of Switzerland are Zürich and Basel, the former producing mainly plain and figured fabrics, the latter mainly ribbons. The weaving is still part done by hand. The cotton manufactures are mainly carried on in the north-east, in Zürich and the adjoining cantons, but there are numerous bleaching,

[1] The value of the Swiss exports under the head of machinery and locomotives in 1911 was about double that of the imports.

dyeing, and printing establishments in the canton of Glarus, in some of the deepest Alpine valleys. Machine embroidery and lace-work are pursued chiefly in the cantons of St. Gall, Appenzell, and Thurgau. St. Gall, which has been noted for its hand embroideries (mostly on linen), as well as its linen manufactures, since the thirteenth century, is now the centre for the industry not merely in Switzerland, but also in the neighbouring parts of Austria (Vorarlberg and Liechtenstein) and Germany (Bavaria), where similar conditions prevail, small peasant farmers and their families supplying much of the labour and recruiting in the industry labour for their farms in the harvest time. The embroidery machine was introduced into St. Gall in 1840, and it is since then that the industry, which is still, however, partly domestic, has grown to its present magnitude. The variety and richness of the patterns have been enhanced through the introduction of the sewing-machine about a quarter of a century later. Watch-making is principally carried on in the Swiss Jura, where it has been practised since the beginning of the eighteenth century, and where there is a high degree of hereditary skill now combined with the most advanced organisation. Formerly hand labour was exclusively employed in Swiss watch-making, but in recent years the keenness of foreign competition has led to the establishment of factories with the necessary mechanical appliances. The chief seats of the industry are Locle and La Chaux de Fonds in Neuchâtel, Bienne, St. Imier, and Porrentruy in Bern, but the watches are known by the name of Geneva, which is one of the chief centres of the trade in this article. The manufacture of chemical products, especially aniline dyes and drugs, is important at Basel, and in recent years the water-power of Switzerland has been made use of in the manufacture of aluminium (at Rheinfelden) and carbide of calcium.

872. The capital of the republic is Bern, on the river Aar, but, as is shown below, the two most populous towns are Zürich and Basel. These also have the most commanding situations commercially—Basel, on the German frontier at the head of the plain of the middle Rhine (**827**); Zürich, the centre of a highly populous region, and a place of convergence of railways of great importance since the construction of the St. Gothard line, which runs thence southwards, and the eastern line through the Arlberg tunnel. Geneva, in the narrow opening formed by the Rhone valley between the Alps and the Jura, has the best situation in relation to Marseilles. (See map, pp. 396–7.)

873. In **transmarine commerce** the chief North Sea port made use of by Switzerland is Antwerp, especially in the case of the export trade, which is mainly in relatively valuable articles, for which inland water carriage is unsuited. For much of the imported grain, however,

Zürich . . .	210,000	Lausanne . . .	70,000
Basel . . .	135,000	St. Gall . . .	70,000
Bern . . .	105,000	Geneva . . .	55,000

Rotterdam is the port and Mannheim is the chief distributing centre, though the recent improvements of the Rhine no doubt enable much of it now to reach Basel. Havre and other French ports are the chief places of export of Swiss silks and watches, and Havre is the chief importer for Switzerland of raw cotton, though it has a growing rival in this trade in Bremen. Hamburg is the chief Swiss port for Central and South America, St. Nazaire and Bordeaux coming next. For the Baltic trade the chief port, as is natural, is Lübeck. For the trade of the Mediterranean and all that passes through the Mediterranean, including South American grain, Marseilles is the chief port, but in the Levant it has a growing rival in Genoa. From the returns of the consignment trade of the United Kingdom we now learn that Switzerland exports to this country a large value of silk manufactures and ribbons, of embroidery and needlework, watches, condensed milk, straw-plaiting, &c., and receives from this country unbleached cottons, cotton thread and yarn, woollen and worsted goods, woolwork, and a great variety of other articles.[1]

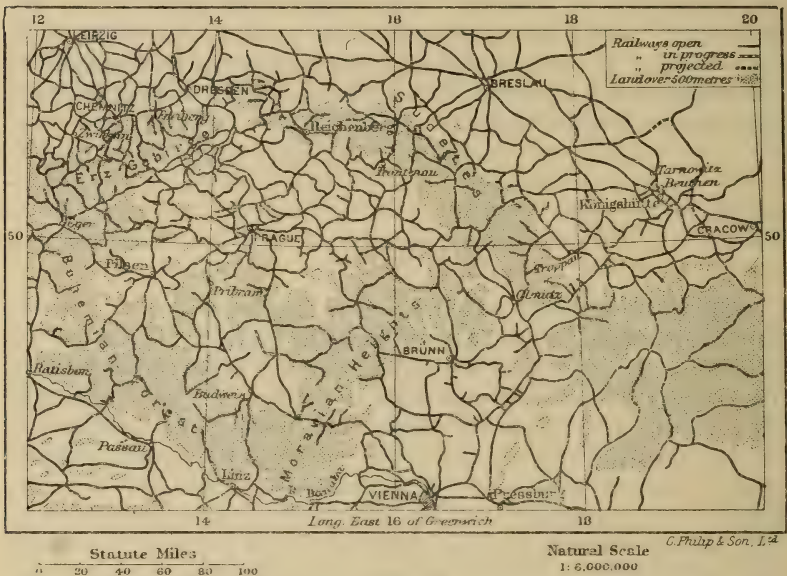
2. AUSTRIA

874. Of all the states carved out of or largely made up of territory formerly belonging to the Austro-Hungarian Monarchy, this is the one in which on the whole most respect has been paid to natural boundaries. The northern boundary is with slight deviations that which separated the archduchies of Upper and Lower Austria from Bohemia, and that between Germany and the Tirol. The western is the former boundary with Switzerland as far as the Reschenscheideck. The new boundary begins on the west side of that pass, and then runs first eastwards along the high water-parting between the basins of the Inn to the north and those of the Adige and upper Drave to the south, through the Brenner Pass to the Dreiherrenspitze. It thus cuts off to the south a considerable Alpine territory known as the Trentino, the northern part of which is German in speech, while the southern part has long been Italian. From the Dreiherrenspitze it runs first south-east across the Drave, then on the whole east, again and again following minor water-partings. On the eastern side the boundary is mainly artificial, and has been pushed a little eastwards beyond the former Hungarian boundary, so as to include a strip in which the inhabitants are mainly German in language.

875. The directness of the Brenner route, which runs with com-

[1] In 1912 the value of the consignments from Switzerland to Great Britain was £10·6 millions, of which nearly 60 per cent. came through French and 37 per cent. through Belgian ports; that of the consignments of British produce to Switzerland was £4·0 millions, of which nearly 90 per cent. went through Belgian ports.

paratively slight deviations from north to south between Innsbruck and Verona, and enables the whole width of the Alps to be crossed by means of a single pass under 4,500 feet in height, would at all times have given it a high degree of importance if it had always been available. It was certainly used in prehistoric times in the trade in Etruscan bronzes and earthenware and Baltic amber. It was one of the passes across which the Romans made a transalpine road. In the middle ages, however, it got obstructed by landslips in the narrow gorge of the Eisak above Bozen, and was long in part neglected down to 1480, when it was again made practicable for wheeled vehicles. Even during this period, however, the route was not wholly abandoned. The obstructed portion was avoided, and the Brenner route joined again, sometimes



from the east by way of the Pustertal, sometimes from the west by ascending the valley of the Adige as high as Meran, and thence going north-east across the Jaufen Pass, which rises, however, to nearly 6,900 feet, and involves a descent to about 3,100 feet before the Brenner is crossed. Frequently the Brenner route was avoided altogether; the valley of the Adige was ascended to its head in the west of the Tirol, and the Inn valley was then reached by the Reschenscheideck, which is under 4,900 feet. In this case Augsburg was reached by the Fern Pass (4,100 feet), a little to the west of the Seefeld (**859**). From 1480 the Brenner route has been used continuously. A modern carriage road, made across it in 1772, was the first of the kind made across the Alps, and the railway across it, completed in 1867,[1] was the first of the great

[1] The longest tunnel on this line, more than half a mile in length, is in the side of a mountain to the south of the Brenner.

transalpine railways. It is noteworthy that the three most populous towns in the former crown-land of the Tirol, Innsbruck, Bozen, and Trent (859), are all on this route.

876. Agriculture is carried on more extensively in the Danubian tracts of Upper and Lower Austria than elsewhere, these parts having

the only considerable areas suited to wheat and maize as well as coarser cereals. The Alpine provinces are predominantly engaged in forestry, together with the cultivation of rye and oats and the rearing of cattle, which is here carried on as in Switzerland (868). The forests are mainly in the hands of small owners and are for the most part badly managed.

877. The chief **minerals** are iron ore and salt. True coal is almost

entirely wanting.[1] But lignite (**510**) abounds among the more recent tertiary rocks in the east of the Alps, and especially in the Styrian valley of Kainach, which opens from the right into that of the Mur below Graz. In northern Styria, at Eisenerz, a little to the south-east of the northerly bend of the Enns, on the north side, and at Vordernberg, on the south side of the Erzberg, are the chief Austrian iron ore workings. The Erzberg, that is, 'Ore mountain,' situated at this place, is almost one entire mass of an iron carbonate, and the ore, which has been mined for 2,000 years, is obtained from open-air quarries. More valuable kinds of iron ore (limonite and siderite) are obtained from the Hüttenberg Erzberg, in the north-east of the neighbouring province of Carinthia, which ranks next to Styria in iron ore production. Salt is abundant in the Salzkammergut, in the south-west of Upper Austria, at Hall in northern Tirol, below Innsbruck, and at Hallein in Salzburg, above the town of Salzburg. Extensive deposits of china clay have been found half-way between Linz and Passau.

The working of iron and steel in all forms is chiefly carried on at two places, one Steyr, in Upper Austria, close to the Bohemian frontier, which is in direct railway communication, chiefly by the valley of the Enns, with Eisenerz, and the other, Donawitz, close to Leoben, at the mouth of the valley leading from the Mur up to Vordernberg. Graz, in southern Styria, in a small expansion of the Mur valley, and Klagenfurt, the capital of Carinthia, and the nearest important town to the iron region of that province, both carry on iron along with other industries.

878. The one large town left to the new state of Austria is Vienna. Being situated at the base and partly upon the foot-hills of the Alps at the east end of the narrow valley through which the Danube flows after leaving Germany, it is so situated as to cause all the traffic between the Hungarian plains and southern Germany to converge on it, and the value of this position is enhanced by the comparatively easy routes to the Adriatic. The oldest and lowest of the transalpine railways, that by way of the Semmering Pass, leads to Venice, and a still shorter route (**646**) connects it with Trieste. Such advantages are sure to maintain it as a great commercial and industrial centre, but now that it has ceased to be the capital of a great monarchy the city cannot expect to retain the importance that it once had.[2] Before the war its manufactures included silks, machinery, bentwood furniture, fancy wares, and many others.

[1] Though it is reported (1921) that an important deposit has been discovered at a place called Spielersdorf, in Upper Austria.

[2] Vienna pre-war population 2,000,000; in Jan. 1920, 1,840,000.

Graz	160,000	Linz	100,000

SOUTH-EASTERN EUROPE

(Excluding the greater part of the Balkan Peninsula)

CZECHOSLOVAKIA, HUNGARY, YUGOSLAVIA, ROUMANIA

879. This part of Europe is made up of states wholly or in large part formed of fragments of the former Austro-Hungarian monarchy. It is mountainous in the north, east, and south, partly also in the west, but these mountains enclose the great plains of the Danube, and the kingdom of Roumania also comprises broad plains outside of this mountain encirclement. The maps on pp. 412 and 413 show how far these mountains still form barriers to communication, especially in the eastern half of the area. In the western half the provision of railway facilities was stimulated, as between opposite sides of the Pennines in England, by the great density of the population on both sides.

880. Down to recent times the Carpathian Mountains, separating Hungary and Transylvania from Galicia, Russia, and Roumania, had much longer intervals uncrossed by rail than the Alps, but this was not because they are more difficult to cross, but because the more populous regions on the opposite sides yield for the most part similar products, and the wide intervening belt yields little but timber.

881. A very important feature of the geography of this region is the **easy access from the great Danubian plains** to the most important valleys of the Balkan Peninsula. The approach to two valleys leading to the Aegean Sea is made by the Morava, a right bank tributary of the Danube, joining the main stream a little below the confluence of the Save. A southern route continuing the ascent of this valley leads to a water-parting only 1,750 feet in height, and then down to Salonika, either by the railway route by the valley of the Vardar through the gorge of the Iron Gate, or, as in the middle ages, by a more open and less dangerous route to the east through the basin of Shtip and by the valley of the Strumnitza. A side valley leads from Nish on the Morava eastwards up the Nishava and then across a pass 2,400 feet in height to the valley of the Maritsa, and so to Constantinople and Dede Agach. These openings facilitated the movements of conquerors and settlers in opposite directions at different times. The settlers were mainly Slavs, who poured in from the eastern plains of Europe, and in the ninth century seemed likely to give rise to a great Slavonic empire extending from the Peloponnesus to the Baltic, minor valleys, tributary to the

Danube, favouring their penetration in the north-west of the Balkan Peninsula. In the tenth century, however, this possibility was removed by the invasion of the interior Danubian plains by the Turanian horsemen, who founded the kingdom of Hungary, and formed a permanent separation between the northern and southern Slavs; the northern now represented by the Czechs in the western and middle parts of Czechoslovakia, and the Slovaks in the east of the same state, the southern by the Slovenes, Croatians, and Serbians in that order from west to east. The language of all three is the same, with small dialectical differences, and is more closely allied to the Ukrainian spoken in the south-west of Russia than to the Slavonic languages of the northern states. Though these southern Slavs, including the inhabitants of the Dalmatian coast, are now all united in the single state, conveniently though not officially known as Yugoslavia,[1] they differ in religion, the Slovenians, Croatians, and Dalmatians being Roman Catholics, while the Serbians mostly belong to the 'orthodox' (Greek) church, although a large proportion of them in Bosnia are Mohammedans.

882. The movement in the opposite direction by the openings mentioned was that of the Turks, but they were rather conquerors than settlers. The Mohammedans of Bosnia are the descendants of those who were induced by the temptation of special privileges to adopt that faith. But Turkish dominion at one time spread far north. By the end of the seventeenth century it extended over the plains of Hungary to within a short distance of Vienna, although not eastwards into the more mountainous tracts within the Carpathians. But in this region there is a great intermingling of population from other causes. Outside the Carpathian Mountains and the Transylvanian Alps, as that portion of this system which stretches east and west to the south of the tributaries of the Tisa (Theiss) is called, live a people speaking a language descended from the Latin and claiming descent from Roman settlers of the time of the empire, a claim to which expression is given in the name of Romania,[2] which they give to their country. But Roumanians are not confined to this external area. They also form the bulk of the population in Transylvania, that is, the territory within the mountains above named. How they came to be there and how long they have dwelt there is unknown, but it should be remembered that the territory on both sides of the mountains belonged to the ancient Roman province of Dacia.[3] With the Roumanians in Transylvania are intermingled a considerable proportion of Hungarians (Magyars), as a result of the long-continued Hungarian domination in this region, partly, it is conjectured, as the result of an early settlement made even

[1] It is officially known as the kingdom of the Serbs, Croats, and Slovenes.

[2] Such is the native spelling of the name of this country.

[3] When we observe how gold mines attract population to a region in which the settlers afterwards take to other occupations it may be suggested as a possibility, but no more, that the Transylvanian Roumanians are descendants of such a population attracted by the gold mines of Aquincum, in the south-west of Transylvania.

before the period of domination. The Magyars, known as Szeklers in the south-east, where they form a more compact element of the population than elsewhere, are believed to be such a remnant. Both in Hungary and Transylvania are also to be found isolated colonies of German settlers, many of them formed on the invitation of the state. The Hungarians have a saying, 'The Magyars founded the state, the Germans built the cities.' Hence the frequent occurrence of the element Deutsch (German), Nemet (Magyar), Szasz (= Saxon), all meaning German, in place-names.

883. These racial and linguistic differences have had a great influence in the formation of the new states brought into being as the result of the war; and it is obvious that they must still continue to create great internal difficulties as well as tend to cause friction in the mutual relations of the states. Manifestly, too, the breaking up of a great empire within which there was formerly free trade must place new obstacles in the way of commercial intercourse, obstacles all the more serious in the case of industries which are largely dependent on the assemblage of resources now severed from one another by customs barriers. It is a state of things that creates the need, and one can only hope may in the end promote the spirit, of mutual accommodation, of which lamentably little has so far been seen in the course of human history. One may perhaps think with hope of what was achieved in this way after the American colonies had established their independence (**1274**), but cannot be blind to the fact that the European situation here sketched is one of enormously greater difficulty.

884. The **rivers** of this area form an important auxiliary to the means of communication. On the Danube as an international waterway see **650-652.** A serious impediment to navigation on the Danube formerly existed at the rapids known as the Iron Gate at the lower end of a series of rocky defiles sixty miles in length in the west of the Transylvanian Alps, but since September 1896 these reaches have afforded throughout a navigable channel of 10 feet in depth. The mouth of the Danube from Braila, about 100 miles up, is under the control of a European commission first appointed under the treaty of Paris in 1856. The Sulina distributary, the only one with a sufficiently gentle current to be free from excessive deposits of sediment, is kept constantly dredged, and efforts are being steadily made to deepen it.[1] The difficulty of accomplishing these operations is greatly increased by the deposits brought down by swift and turbid rivers flowing from the north, especially the Seret and the Prut.

Of the tributaries of the Danube, the Tisa (Theiss), whose tortuosity has been greatly reduced by canalisation, is navigable for steamers to Tokay; the Drave to the confluence of the Mur, by smaller boats as high as Villach; the Save to Sisek at the confluence of the Kulpa,

[1] There is now a depth of from 22 to 24 feet, as high as Braila, so that this port is accessible to vessels of 6,000 tons fully laden.

366 miles above Belgrade, but its navigation is impeded by sandbanks and shifting channels.[1]

885. Though the Elbe proper begins to be navigable only at the confluence of the Moldau, the navigation of that river may be said to begin at Prague, whence a steamboat company maintains regular communication with the middle Elbe and with Hamburg, which facilitates the use of this port even by Vienna.

886. As to **climate,** the inner lowlands are more especially subject to those extremes of temperature which become more characteristic as we go eastwards. With the exception of the maritime tracts, even the warmest parts of the area have at least two months in the year in which the mean daily temperature is under the freezing point, and all the lowlands of the Hungarian section have three or four months in which the mean daily temperature is above 68° F. North of the Carpathian Mountains the summer temperature is more moderate, and in the eastern part of the empire it is only within that system, except in the southern part of Roumania, that a summer temperature lasts long enough for the cultivation of the vine. On the other hand, even in southern Roumania the winter temperatures are very low. The average mean January temperature at Bucharest is 25° F. (against 39° in London or Edinburgh). A striking result of the physical structure of the Balkan Peninsula on the route to Salonica is that it allows piercingly cold winds to blow with great violence down the valley of the Vardar—the now well-known Vardar wind, a concentration and intensification of the northerly winter wind to the north of the mountains known as the *koshava*. On the pusstas, or vast Hungarian plains east of the Danube, so great is the summer heat, and so rapid consequently the evaporation, that though there, as in most other parts of the empire, summer is the season of greatest rainfall, these plains, which in winter are a succession of morasses or storm-swept snow-wastes, present during the hot season the appearance of withered deserts.

1. CZECHOSLOVAKIA [2]

887. This republican state is made up of the former crownlands of Bohemia and Moravia, the greater part of Austrian Silesia, and the mountainous or hilly tract of northern Hungary along with, on the south, a small strip of the Hungarian plain with a considerable Magyar population (**882**). Its western and northern frontiers are thus in a

[1] It is proposed to shorten the navigation by canalising the winding part of its course near Zagreb (Agram).

[2] See the article, with map, by Emm. de Martonne, in the *Annales de Géographie*, No. 159 (May 1920).

large measure natural, following the crest of mountain ranges, and everywhere, except in Slovakia, they include within the frontier a large German population, which is estimated to make up about 16 per cent. of the total. The Slovak portion of the state has mines of the precious metals, besides iron and salt, but is otherwise poor; but the remainder includes all that part of the former Austro-Hungarian monarchy which had the most abundant and varied resources.

888. The **richest agricultural district** is that towards the north of Bohemia drained by the Elbe and its left bank tributary the Eger. Here, in addition to all the cereals of the temperate zone, are grown sugar-beet, hops, the vine, tobacco, flax, and hemp. Sugar-beet is also largely cultivated in the valley of the Morava, and just before the war the territory now embraced by this state was estimated to be the second in Europe in the production of this commodity, the total yield being equal to more than half that of Germany. Large quantities were exported to the United Kingdom, either refined (mainly from Bohemia by way of Hamburg) or raw (mainly from the Morava valley by way of Trieste). The western part of the state is also the richest in **minerals.** The main deposits of coal lie to the west and south-west of Prague, those of lignite immediately to the south of the Erzgebirge. True coal is also mined in the Teschen district formerly part of Austrian Silesia. Iron ore is found near Prague, but not in large quantity, so that the Bohemian iron industry is now likely to suffer from being severed from the Styrian ores. These regions have long been also the principal seats of **manufacturing industry,** and have naturally remained so under the changed conditions due to the application of machinery. In the east, however, the iron deposits of Ozd, 75 miles north-east of Budapest, with large iron works using Silesian coal, have been acquired from Hungary. Woollen and linen manufactures, both sustained at one time principally by local supplies of the raw material, now make great demands for raw material on distant countries. Cotton and jute manufactures have likewise sprung up (**439**). Woollen manufactures flourish chiefly at Reichenberg, in the extreme north of Bohemia, at Brünn and Iglau in Moravia, and Troppau in Silesia. Pilsen and many other smaller towns carry on a vaiiety of textile industries.

Glass-making, which was introduced into Bohemia from Venice in the sixteenth century, and for which Bohemia has acquired and long retained a high reputation, especially as regards the treatment of crystal, is pursued chiefly at Eger (Cheb) and other places near or belonging to the Bohemian Forest, where the geographical conditions are as favourable to it now as they always have been. The forest supplies not merely fuel but potash, and since silicate rocks have come to be used in glass-making (**597**) this material is also obtained from the forest, and coal, as already indicated, is at no great distance. Gablonz, not far from Reichenberg, has long made a specialty of the

Brünn . . .	125,000	Pilsen . . .	80,000

manufacture of small articles of glass—buttons, beads, sham jewels, bangles, &c.—which find their way even to the most distant parts of the world. Porcelain is made, among other places, near Carlsbad, on the river Eger, where there are deposits of kaolin (**590**). Pilsen is noted for its beer.

889. Prague is the old capital of Bohemia, a province which is marked out by nature in the most unmistakable manner, and in which a dense population has existed from a remote period, and is now the capital of the republic. It occupies a situation which a variety of physical features combine to fix as a commercial centre. It lies near the middle of the province, at the head of navigation on the Moldau for boats of considerable size, about the place where the steeper ascent to the highlands of southern Bohemia begins, and at the meeting-place of roads from gaps in the mountains on the east and west (**194, 822**). Bratislava (Pressburg) on the Danube where that river enters the state has for that and other reasons an important commercial situation.[1]

2. HUNGARY

890. This ancient kingdom (**882**), now under a regent, is confined to the plains of the Danube where the population is predominantly Magyar, but not without admixture. These plains, known in Hungarian as the Alföld (i.e. ‘lowland’), formerly deserved the name of pusstas (**886**) or ‘desert’ in a much greater measure than they do now, a great deal of reclamation having been carried on in recent years. On the one hand, the introduction of the *Robinia pseudacacia* has enabled other trees also to thrive, and has thus led to the establishment of forests and vineyards on tracts that were previously sandy wastes. On the other hand, extensive swamps have been rendered habitable by the regulation of the Tisa. **Agriculture,** including the rearing of live stock, is here the prevailing industry. The dry climate is well suited to the growth of wheat rich in gluten (**259**). Down to the time of the war both branches of agriculture were steadily improving. Manure was being more and more largely used and the average yield of wheat increasing. Large quantities of agricultural machinery were coming to be used, small cultivators uniting to purchase machines. Among agricultural specialties may be mentioned the wines derived from vineyards occupying old volcanic soils in the north. The most

[1] It is regarded as the future focus of a great system of European waterways embracing canal connections with the Rhine (**650-52**), Elbe, Oder, and Vistula.

Prague . . .	225,000	Bratislava. . .	75,000

celebrated are round the village of Mád on the slopes of a hill to the north-west of Tokay, which gives name to the wine; but other highly esteemed Hungarian wines come from other volcanic soils further west, clothing the slopes of Matra. Great attention has been paid in recent years to improving the breed of the more important domestic animals, including the pig, and there are large government horse and cattle breeding establishments—the horses chiefly English and Arab breeds, the cattle mainly the Swiss Simmental, which is good both for meat and milk. Some coal is found within the angle of the Danube to the north-west of Budapest and also near Pécs, in the south west, and a little iron near Szeged, on the Tisa opposite the confluence of the Maros, but there are no other important minerals.

891. Manufacturing industries in the modern sense of the term are scarcely developed at all except in the capital. This territory, being mainly one in which even agriculture has only recently begun to advance under the stimulus of cheapened communication with distant markets, does not even yet afford a market for manufactured products at all corresponding in value to its population. The peasants are poor, and wear chiefly coarse woollen fabrics, strong enough to last for years or almost a lifetime, and many of them simply sheep-skins with the wool turned inwards. But there can be no doubt that advancing agriculture will steadily increase the requirements of the people.

892. The capital is Budapest, situated on both banks of the Danube in a position strengthened by the spurs of the last hills skirted by the river before it traverses the Hungarian plains. It is the only city in the state comparable with those of western countries. The other towns, such as Szeged, Kecskemet, Debreczen, and Szabadka, are more like large agglomerations of villages, being spread over areas of from 310 to 375 square miles in extent (compare Midlothian, 362 square miles).

3. YUGOSLAVIA

893. This kingdom [1] stretches from north-west to south-east, mainly through the Balkan Peninsula, but includes also in the north more than a third of the former duchy of Styria, the greater part of Carniola, a small part of Carinthia, and considerable areas detached from the former kingdom of Hungary.

In respect of **physical features** it is mainly mountainous in the north-west and west: in the north-west traversed by the south-eastern

[1] See the article, with map, by Yver Chataigneau, in the *Annales de Géographie*, No. 164 (March 1921).

Budapest (1921) . .	1,185,000

members of the Alps with an east-west trend; in the west by the ranges of the Dinaric Alps, which trend from the north-west to the south-east, the eastern chains largely composed of carboniferous limestones, including in places steep and rugged dolomitic summits, the western composed of the cretaceous limestones of the region known as the Karst or Carso, an area presenting to view mainly expanses of grey naked rock with patches of soil of varying depth, generally thin, only in isolated hollows, and, in spite of a heavy rainfall (**621**), without surface water, except where it emerges in springs from the base of characteristically fissured cliffs. These features extend into western Bosnia, but the north-east of that province is composed of a gently undulating, fruitful, densely peopled hill country, sinking gradually to level plains traversed by the Save, Danube, and Mur. The south-east of the kingdom is mountainous, but with fertile valleys and basins.

894. Agriculture forms by far the most important industry of the state, though the land under the plough is equal to little more than one-fourth of the surface, the proportion, however, rising to 68 per cent. in the principal agricultural area, that known as the Vojvodina, made up of the eastern plains north of the Danube, to a large extent covered by lœss, which in summer is an almost unbroken expanse of maize and wheat. Further to the west the surface, while still offering much arable land, rises towards Zagreb (Agram), and still further west the arable land is found in isolated basins, the most important of which is that of Ljubljana (Laibach), about 25 miles in length by 6 in width, everywhere at a level of more than 900 feet above that of the sea. Maize and wheat are the principal crops of the entire state, occupying about the same extent of ground, but maize giving by far the largest yield. Among other crops may be mentioned sugar-beet, rapidly increasing in extent, hops, hemp, and flax. Fruit trees and above all plums abound, and the vine is largely cultivated, especially on slopes with a favourable exposure in the north-east both north and south of the Danube. Cattle are largely reared in the Alpine districts, horses chiefly in the Vojvodina, and pigs in great numbers in all the most populous parts of the state. Sheep and goats are most numerous in the Carso, the latter to a large extent a pest through their habit of devouring the tops of growing trees. **Forests** are most extensive in the Alps and in Bosnia. Dalmatia, the maritime tract of the kingdom, has all the products of a Mediterranean country with laurel thickets, groves of pines and cypresses, besides olives, figs, oranges, and citrons.

895. Among **minerals** the most important are coal, met with in various places, iron ore (magnetite) and copper, both in the north-east in the tract south and west of the Danube, lead to the south of Belgrade and north-west of Ljubljana, salt in the north-east of Bosnia,

Belgrade . . .	120,000	Sarajevo (Bosnia) .	50,000

and bauxite in Dalmatia. The principal coal-mines lie between Ljubljana and Zagreb, and furnish fuel to blast-furnaces smelting imported ores in the Ljubljana basin.

The external **commerce** consists chiefly in the exporting of maize, fruits, timber, and copper. So far as it is not carried on by way of Belgrade, the capital of the kingdom, and the railways and waterways which radiate thence, it makes use of the foreign ports of Trieste, Fiume, and Salonica, on which the region has always been mainly dependent for sea-going traffic. Spalato is at present the only fairly active port belonging politically to Yugoslavia.[1]

4. ROUMANIA [2]

896. Of all the European states which had their boundaries re-adjusted at the conclusion of the great war, Roumania is that in which least regard seems to have been paid to the physical features in the delimitation of the frontiers. The mountains which formed topographically a natural boundary for the older Roumania on the north and west now run through the middle of the kingdom. On the other hand, it may be pointed out that the river Dniester, which is now recognised by the great powers as the eastern frontier north of the Black Sea, is well adapted for that purpose from a strategical point of view, its lower course flowing through a broad and swampy valley, like most of the Roumanian side of the lower Danube, while the higher part is deeply sunk in a narrow trough. Inside the mountains the northern and western frontier winds through cultivated lœss, sandy pusstas (**886**), and marshes similar to those of the Hungarian plain. The mountains which divide the kingdom into two parts are themselves composed of two parts, contrasting with one another both in geological structure and in form. The portion running east and west, known as the Transylvanian Alps, is mainly composed of ancient crystalline rocks with steep forest-clad slopes, while that whose trend is mainly north and south is composed of softer rocks largely denuded of forest, and generally lower in elevation. The Predeal Pass, nearly due north of Bucharest, approximately marks the limit between the two sections.

897. The part of the country outside the mountains is again made up of two portions, which, though very far from equal in area, must

[1] Seeing that the bay of San Giovanni di Medua, which seemed the most promising Adriatic outlet of southern Yugoslavia, has been assigned to the principality of Albania, the connection of Cattaro (Kotor) and Metkovich with the railway system of the interior is now contemplated.

[2] See the article, with map, by Emm. de Martonne, in the *Annales de Géographie*, vol. xxx., No. 163 (Jan. 1921).

Zagreb . . .	80,000	Ljubljana . . .	60,000

be treated separately: a section on the left of the Danube and partly north of the Black Sea, formed of the old principalities of Moldavia and Wallachia, together with the recently added Bukovina and Bessarabia, and the Dobruja, on the right bank of the Danube. The former section may be described as a continuation of the Galician plateau in the northern or Bukovinian and Moldavian area, and of the Russian plain in the southern or Wallachian area. Bessarabia, though inhabited mainly by Roumanians, except in the south, where there are many Bulgarians (to the west) and Russians (to the east), was in Russian hands down to the war, the greater part from as far back as 1812, the remainder from 1878. The **climate** and **products** are similar to those of the adjoining part of Russia. Maize is the principal crop, as it is the chief food of the small peasantry occupying the numerous villages among the hills, whereas wheat is the great crop of the lœss-covered plains, where it is grown mainly for export by large landowners using advanced agricultural machinery. The cultivation of wine and sugar-beet is spreading. The table of exports in the Appendix shows that the list is headed by wheat, maize, and other grains, but there is a growing export of oil-seeds and petroleum,[1] and it is probable that these commodities will continue to be the chief exports of the enlarged state. The petroleum is produced along the face of the Carpathians, to the north-west of Bucharest, and to the south-west of Jassy, and the production is largely controlled by an English company called the Roumanian Oil Trust. As to the Danube navigation see par. **884.** The principal Danubian ports in Roumania are Galatz, situated at the point where the Danube on receiving the Seret turns eastwards, and Braila (Ibraila), at the next bend of the river higher up. The former is the natural port for northern Roumania, the latter for southern Roumania, including Bucharest. Above Braila, the value of the Danube for Roumanian commerce is somewhat impaired by the low and marshy character of the river bank, which affords few good sites for towns. Galatz serves as the chief port even of Bessarabia, Akkerman on the shallow Dniester liman or lagoon having only local services to Odessa, and inland up the Dniester to the Yampol rapids.

Besides Bucharest, the capital of the whole kingdom, the chief inland towns are Ployeshti, Craiova, Jassy, the capital of Moldavia, Chisinau, the capital of, and Chernauts, a university town in, Bessarabia, and Timisioara in Transylvania.

898. The Dobruja, which since 1913 extends to the Tutrakan-Balchik line, thus including a considerable tract inhabited by Bulgarians and Turks, is made up to the extent of about half of its area of uninhabitable and unhealthy marshes, mainly belonging to the delta

[1] The production of this commodity increased from 21,000,000 gallons in 1896 to 475,000,000 gallons in 1912. A project is entertained for improving the outlet for it by the construction of a pipe-line from Ployeshti along the route of the railway to Kustenji.

of the Danube. The remainder is habitable and to a large extent fertile land, but so far the province is mainly pastoral in its character. Wool is produced in large quantity. A railway from Bucharest crosses the Danube at Chernavoda by a bridge opened in 1895, and runs thence eastwards to Constantsa or Kustenji, its chief port. The port of Mangalia is further south.

899. The interior or Transylvanian portion of the kingdom added after the great war is an intricate complex of forest-clad heights enclosing cultivated valleys and basins, with vineyards and orchards on the slopes enjoying a southern aspect. Forests occupy nearly 40 per cent. of the surface. The strip of plains abounding in cereal crops on the west is generally narrow, widest in the Banat. Cattle and sheep are numerous, and even before the war migratory shepherds led their sheep across the mountains to winter in Wallachia, on the borders of the Danube. This territory adds also to the variety of the Roumanian mineral wealth. The gold mines near the former royal smelting works at Zalatna, to the north and west of the Maros in about 46° 10′ N., are the most productive in Europe next to those of the Urals. Coal and iron ore are both found in the Banat, where iron and steel works have for some time been in operation near Reshitsa and Anina. Rock-salt and natural gas occur at several points.

Bucharest . .	340,000	Galatz . . .	75,000
Chisinau (Kishinef) .	115,000	Timisioara (Temesvar)	70,000
Jassy . . .	75,000	Braila . . .	65,000
Chernauts (Czernowitz)	85,000		

EASTERN EUROPE

900. The former empire of the tsars has been broken up in consequence of the war into many states claiming independence, but which of those claims will ultimately be made good is so uncertain that it is inadvisable at present to accord them individual treatment. In any case the geographical unity of the former Russia in Europe within the limits assigned in this work to that continent, which exclude the whole of Caucasia, is sufficiently marked to justify its still being described under one head. Poland has already been described under the general heading of North Central Europe; and Finland, which had a separate customs frontier even before the war, has a separate paragraph, as it had in former editions of this work; but the other states are merely enumerated in this paragraph, in which also are given the abbreviations by which those states are referred to when mention is made of any place or region belonging to one or other of them. These states are Esthonia[1] (E.), with Reval for its capital, occupying a territory inhabited by a people closely allied to the Finns on the south side of the Gulf of Finland, a state recognised by the Allied Powers and by Soviet Russia; Latvia[1] (La.), capital, Riga, round the Gulf of Riga, to the south of Esthonia, inhabited by Letts, who also speak a language distinct from the neighbouring Slavonic language spoken in Russia; Lithuania[1] (Li.), capital, Vilna, still further south, whose inhabitants are closely akin to the Letts, speaking the same language with only minor peculiarities; Ukraine (U.), capital, Kief, a large territory in the south-west adjoining Poland and Roumania, in which the prevailing language is the dialect known as Little Russian. The remainder is under the government which since the revolution of November 1917 has had its seat at Moscow, and theoretically derives its authority from *Soviets* or councils elected by the workmen, soldiers, and peasants of the country so far as its authority extends.[2]

[1] The three states are promoting common action under various heads, and are now (August 1921) aiming at the formation of a customs union.

[2] And it now (1920) extends at least in the cities over large areas claimed by some of the States named.

Old Russia

901. The **surface** of Russia, though mainly made up of one vast plain, and thus presenting scarcely any of the obstacles to communication such as we have had chiefly to consider in the case of the countries already treated, offers difficulties of another kind, and these natural difficulties, together with other causes, have prevented Russia from acquiring to this day anything like adequate facilities for transport, and especially by land. The marshy character of a large part of the surface and the want of road-making material (both stone and wood being entirely absent throughout large areas in the south) have stood in the way of the construction of roads. For half the year the substitute for roads is, as usual in such regions, tracks formed by the repeated passage of wheeled vehicles, and apt to be rendered scarcely passable by bad weather. In winter a better substitute is found in the use of sledges.

902. The deficiency of roads is to some extent made up for by the abundance of the **natural waterways** and the ease with which they can and have been connected by canals. The great majority of the rivers are navigable nearly to their source, many of them for a great distance by steamers. In all there are 51,800 miles of inland waterways in Russia, less than 1,400 being artificial. Nevertheless, this means of communication is attended by various drawbacks, which will best be illustrated by a few particulars.

903. From Tver, the head of steam navigation on the Volga, the direct distance from the mouth of the river is less than 900 miles, the distance by river is about 1,650 miles. Before the introduction of steam navigation, so slow was the rate of progress that it was a matter of months to accomplish the distance between Tver and Astrakhan, and even since steam navigation has been introduced the average rate of speed of the post and passenger steamers down stream is only about 14 miles an hour, up stream about $11\frac{1}{2}$ miles, so that if these rates were steadily kept up through the whole route, about five days would be consumed in the passage between these two places in descending the river, about six days in ascending. The time taken by a tug in drawing a train of cargo-boats must of course be much longer.

904. Further, no Russian river-port is on an average free from ice for more than ten months in the year. Warsaw, the head of steam navigation on the Vistula, has on an average 305 days in the year ice-free; Kherson, at the mouth of the Dnieper, in the latitude of La Rochelle in France, only 280 days; Astrakhan, in about the same latitude, only 264 days. Rybinsk, the chief grain-port of the upper Volga, has only 219 days ice-free, Petrograd 218, and Archangel, at the mouth of the northern Dvina, only 177 days or less than half the year. For other examples see the accompanying map.

905. On the Dnieper,[1] the principal waterway to the Black Sea, rocky rapids impede the navigation for a distance of 23 miles on that part of the river which flows from north to south (between Alexandrovsk and Ekaterinoslaf) in the great bend which the stream makes to the east. Though artificial channels have been constructed since 1853 to avoid these rapids, 'they are regarded by all vessels, except undecked flat-bottomed barges, as mere traps, and carefully avoided in descending,' and no cargo boats ever ascend.[2] Rapids also impede the navigation of the Dniester[1] and Bug, and, above Petrograd, the much more important navigation of the Neva and that of the Düna or Western Dvina above Riga. The navigation of the Volga, again, is liable to be obstructed by sandbanks which accumulate rapidly where any impediment occurs in the way of the current.

906. There are other drawbacks still. The Volga, which with its tributaries affords more than 7,000 miles of inland navigation, does not furnish any direct connection with the ocean. Goods intended for the sea are landed at Tsaritsyn, at the point where the river turns south-eastwards to the Caspian, and are transferred by rail to the Don, a river that can be navigated only by steamers of very shallow draught. The Northern Dvina, a fine deep river, flows through a sparsely peopled region, but in one respect it may be regarded as all the more important on that account as a natural waterway, since only by such means was it possible to develop in such a region an export trade in timber and timber products, flax and other commodities, such as its waters carry.

907. The inland navigation of Russia is the cause of a considerable annual outlay on the part of the Russian government, but on January 1, 1902, all charges on goods and shipping on inland waterways throughout the empire were abolished, except for such services as pilotage and the use of special appliances in ports. Many thousands of river vessels are constantly moving between the Neva and the Volga. Many of these are of more than 1,000 tons burden, but even on the larger rivers vessels of considerable size can be used only during the spring floods. It is significant of the backward state of commerce in Russia generally that the total volume of traffic on the waterways, though rapidly growing, is still comparatively small.[3] Of the projects for new canals now being urged forward the most important perhaps is that for a canal between the Don and the Volga, to put an end to the interruption that now exists between the navigation of the Volga and the outside world.

[1] Properly Dnyepr and Dnyestr.

[2] In 1914 the Minister of Ways of Communication introduced a proposal to open navigation on these rapids in a more effective manner and at the same time to provide installation for utilising the water-power (**652**) at a cost of £3·9 millions. This is part of the frequently mooted project for connecting the Black Sea with the Baltic by way of the Düna.

[3] The total quantity of goods transported on Russian rivers increased from 23·3 to 44·8 millions of tons in 1894–1910, but is still much below the amount carried on the inland waterways of Germany, but this does not include the timber rafts, of which upwards of 350,000 are floated down annually.

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908. The extent of the water communication in Russia helped to delay the laying of **railways.** Down to the close of the Crimean war there were only four railway lines in the country. The accompanying map shows the subsequent railway development. The principal difficulties in the way of railway construction presented by the physical features have been due to the rivers, many of which have required long bridges. The ascent of the Ural Mountains is so gradual that on the older line between Perm, at the head of steamboat navigation on the Kama, and Tyumen in Siberia it is scarcely perceptible. On the southern line also the gradients are easy. This line running from Samara by Ufa and Zlato-ust, the centre of the iron industry in the Urals, is now continued eastwards as the Trans-Siberian Railway. It begins its most rapid ascent a little to the east of Zlato-ust, but the steepest gradient is only 1 in 100 and the maximum curve has a radius of 350 yards. A short tunnel hereabouts is the only tunnel on the entire route between the Baltic and Irkutsk. A railway to the harbour of Ekaterina on the Murman coast in the north-west, which is kept ice-free all the year round by the warm water drifted northwards by south-westerly winds (**53**), was opened during the war.

909. Regarding the **climate** of Russia, the reader may be reminded that the country lies in that part of Europe where the extremes of temperatures are greatest and the rainfall on the whole least (**55, 621**). About half the entire area, in the north-east, east, and south-east, has a total rainfall for the year of less than 20 inches. On the whole, the extremes of temperature are greatest and the rainfall least in the south-east—say beyond a line indicated by the position of Odessa, Saratof, and Orenburg (see map). The south-west is the region in which both temperature and precipitation are most favourable to production.

910. The nature of the climate puts a limit to **cultivation** both in the north and the south-east, and the arable land of Russia proper makes up only about 26 per cent. of the surface. A northern zone, the tundra, with only reindeer pastures, is followed to the south by a second zone chiefly occupied by vast forests, that again by a third, in which forests give place more and more to agricultural land, and finally disappear altogether. The region of black-earth, a soil of unsurpassed fertility which is spread over southern Russia in larger or smaller patches from the frontier on the south-west to the hills west of the Volga, is that on which most of the corn crops of Russia are grown. Altogether this soil is estimated to cover one-fifth of the total area of Russia proper, but a large part of this area in the east extends into the region of those steppes which are so arid in climate as to be habitable only by nomadic tribes (Tatars and others). Formerly these tribes were unsubdued marauders whose plundering incursions prevented the extension of Russian agriculture southwards, but nowadays the part of the black-earth zone adapted by its climate for agriculture is acquiring a larger and larger share of the agricultural population of the country.

911. Though one of the tables in the Appendix shows that wheat is by far the most important of Russian **exports,** and the cultivation of which is extending most rapidly, rye is still the largest Russian grain crop. There are also large areas under oats and barley, besides smaller areas under millet, buck-wheat, and maize, the last in the south-west. Wheat and most other grains are exported chiefly from the Black Sea, but it may be mentioned, as an additional illustration of the importance of the Russian waterways, that a great deal of the wheat of the eastern provinces, and even those pretty far south, where wheat is principally grown, is carried by the Volga up to Rybinsk, 'the Russian Chicago,' and thence forwarded by water, or in winter by rail, to Petrograd. To facilitate the wheat trade plans have been formed for the establishment of numerous elevators in the south-eastern districts as well as at Rybinsk. As to Russian flax, hemp, sugar-beet, and wine, see pars. **304, 309, 302,** and **295** respectively. Cigar tobacco is grown round Samara.

912. There are two areas of importance in the vast timber trade of Russia, one in the west and south-west,[1] where the **forests** are mainly in private hands, and one in the north-east, where there are large state reserves. It is the latter area that is developing most rapidly, partly in consequence of the exhaustion of the forests in the west, and partly because of the disproportionately rapid increase in the demand for small timber for pit props, pulp-wood, sleepers, and so forth, such as the northern forests afford. About three-fifths of the timber is carried by water. The principal timber markets are Petrograd, Kronstadt, Riga, Moscow, and Archangel.[2]

913. Though agriculture and forestry form the basis of by far the greater part of the export trade of Russia, the **mineral wealth** of the country is enormous, and its mining and manufacturing industries are rapidly extending. Coal and iron are both abundant. Coal is found principally in four localities, (1) west of the Ural Mountains in a district to which a branch line proceeds northwards from the Perm-Tyumen railway, (2) in a district to the south and south-west of Moscow, (3) in the valley of the Donets (U.), a right-bank tributary of the Don. The last-mentioned field is the largest of all, covering altogether an area of 10,500 square miles[3]—not much less than the aggregate area of the coalfields of the United Kingdom. Lying, however, in a sparsely peopled district, it began to be opened up only late in the nineteenth century.[4] In central Russia and the Volga basin generally the

[1] Largely in the three new Baltic states.

[2] The amount of timber transported increased from about 9·9 million tons in 1891 to about 13·25 million tons in 1908, but nine-tenths of this increase was to meet the demands of the home market.

[3] It is estimated to contain about 18,000 million tons of coal, and 37,500 million tons of anthracite.

[4] Production of this district, about 1885, 750,000 tons; in 1912, 21 million tons (about four-fifths of the total produced in Russia).

principal fuel now used is the residue of petroleum, now one of the chief commodities conveyed on that river and its tributaries. Iron ores are obtained not only in the district of the Urals already referred to, but also in several districts to the south of Moscow, and now most abundantly at Krivoi Rog (U.; **544**),[1] about 100 miles N. by E. of Kherson, where there are estimated to be in all 85 millions of tons of red hematite, containing on the average between 50 and 70 per cent. of iron. Near Kerch (U.), in the east of the Crimea, there are estimated to be about 700 million tons of inferior ores similar to those of Luxemburg. It is in southern Russia that all branches of the iron and steel industry are most rapidly developing.[2] Blast furnaces and iron and steel works of various kinds are increasing in number at Mariupol, Yuzovka,[3] Berdiansk (all in U.), and elsewhere on the Sea of Azov. Berdiansk is the most important seat of the manufacture of agricultural implements in Russia. Krivoi Rog is also becoming a great producer of pig iron. Briansk, west of Orel at the head of navigation on the Desna, is the seat of a large government ordnance factory, and Tula, south of Moscow, of one of small arms. Gold, platinum, and copper are found in the neighbourhood of Ekaterinburg, east of the Urals; mercury in the west of the government of Voronezh (near Nikitovka); salt in the area below sea-level, north of the Caspian, and in the Crimea—in both districts chiefly from brine lakes. The principal brine-lakes are those of Baskunchatski and Elton, in the Caspian region. (See map, pp. 428–9).

914. It will thus be seen that Russia has great advantages for economic development, and though various causes have kept back that development it has been for some time in progress, and there are reasons for believing that it is now likely to go on at an accelerated rate. First, agriculture is advancing. According to Unstead's estimates [4] the wheat area increased by nearly 50 per cent. (from 36·2 to 47·4 million acres) on the average of the years 1901–10, as compared with 1891–1900, and though the yield is very low, that also showed an increase from 8 to 10 bushels per acre. The railway system has of late years been rapidly extending, and this is certain to give a great stimulus to the local industries just as it has done in Germany. Further, a momentous change took place at the end of 1906 affecting the position of the Russian peasantry. Down to 1861 the majority of the Russian peasants were serfs attached to the properties of landowners. In that year they were emancipated in a sense, and portions of the landowners' estates were set apart for them, the government paying compensation which was to be repaid by the peasants by instalments. For this repayment,

[1] In 1895 this centre produced 900,000 tons; in 1899, above 2,500,000 tons.

[2] Very largely with the aid of foreign—principally Belgian—capital, attracted by the high protective duties and other forms of government encouragement.

[3] Or Hughesovka—named after its founder, an Englishman of the name of Hughes.

[4] *Geog. Jour.*, vol. xlii., p. 178.

however, not the individual peasants but the *mir* or village commune was made responsible, and the *mir* as a whole had control of the peasants' land. The land was allotted to individuals in scattered parcels so as to give all an equal chance of getting land of equal quality on the whole, and redivisions of the land took place at intervals of years varying in length in different parts of the country. No member of the *mir* was allowed to leave it at his own free will. By the new law, however, the peasant was made really a free man. He could demand his share of the land in one piece, and buy out his neighbour if opportunity offered. Greater agricultural enterprise was being shown by the more capable. Improved agricultural machinery and implements were being more largely bought and improved methods of farming otherwise being adopted. On the other hand, peasants whose holdings were too small were selling them and becoming labourers. Ultimately these would have been absorbed no doubt by the demands of manufacturing industry. The congestion in the agricultural districts where the land was excessively sub-divided has been relieved to some extent by migration to the more thinly peopled tracts in the south-east as well as to Siberia. Formerly emigration to Siberia was allowed only to villagers, but emigration thither from the towns was permitted from the beginning of 1914 (1013).[1]

915. The **textile industries** have long been flourishing, and factories are steadily superseding hand labour in the districts in which such industries have flourished longest as handicrafts, in Moscow and the populous district round, and in the Baltic states. Through the measures above referred to, the cotton industry [2] in particular was introduced full-blown, and it is characteristic of that industry in Russia generally that it is mainly carried on in mills of large size. The majority of these are in and round Moscow and in the Baltic provinces. In the latter the chief cotton-manufacturing town next to Petrograd is Narva (E.), where the rise of factories has been stimulated by the existence of water-power. The import table in the Appendix shows the increase in the value of the imports of raw cotton and raw wool, but for cotton more particularly this is far from being an index of the growth of the industry owing to the successful efforts to grow cotton within the former empire in Central Asia and the Caucasus. So far have the industries in these materials developed that Russia is already independent of foreign supplies of yarn except in the case of the higher numbers. Next to

[1] This paragraph was written in July 1914, but as the author is unable to regard the present state of things in Russia as permanent it is retained (except for changes of tense) as still not without significance. He ventures now to add that one change due to the Soviet revolution, the seizure of the lands by the peasantry as private property, is not unlikely to be lasting.

[2] Russia is perhaps the only country in the world which by means of protective duties, varying from £7 10*s*. 3*d*. to £29 3*s*. 3*d*. per cwt., managed almost entirely to keep out Manchester cottons. Low wages appeared to aid in maintaining the Russian industry. At any rate, in the central industrial region of Russia (governments of Vladimir and Moscow) the average pre-war wages in all industries were stated to be, for men 30*s*. to 32*s*., for women about 21*s*., for boys and girls 8*s*. to 16*s*. per month.

cotton and woollen products the most important manufactures of Russia in point of value are those of machinery, the other two great textile industries of linen and silk coming next. The linen industry of Russia, which, being nourished by the abundant local supplies of flax (**304**), furnished till about 1820 an important export, is now only slowly recovering from the blows inflicted on it by the introduction of machine-made linens in other countries. The linens, formerly coarse, though strong, are now not to be distinguished from those of western manufacture.[1] All kinds of industries are pursued at the two chief towns of the country, Petrograd and Moscow.

916. The principal **seaports** on the Baltic and its arms are Petrograd, with Kronstadt, Reval, and Riga, the first three on the Gulf of Finland, the last on a river entering the gulf to which Riga gives name. Till the middle of 1885 Kronstadt was the port of Petrograd for all large shipping, but a canal (now admitting vessels drawing $20\frac{1}{2}$ feet) was then opened through the shallow end of the gulf to Petrograd and from that very year the great bulk of the shipping was transferred to Petrograd, notwithstanding the deficiency of its harbour accommodation. The harbour of Reval (E.) has also been deepened and extended, and in recent years it has rapidly developed into a great cotton-port, importing large quantities of this material direct from the United States. Riga is also having its accommodation for shipping improved, by the regulation of the Düna, or Western Dvina. Its port for large shipping is Ust Dvinsk (Dünamünde), at the mouth of that river. The minor Baltic ports (exclusive of those of Finland) are Libau, Pernau, and Windau (all in La.), the first of which (the furthest south) has a very considerable trade. The important seaport of Memel has been detached from Germany, but its relations with the adjoining states of Latvia and Lithuania have not yet (May 1921) been settled.

917. On the Black Sea the chief port is Odessa (U.), the harbour of which, now deepened to 30 feet, being on the sea itself (east of the Dniester), is not so apt to be closed by ice as the river ports. It is the headquarters of the Russian Steam Navigation Company. The shipping both of the port of Nicolaief, on the Bug, and Kherson, on the Dnieper, has to cross the Ochakof Bar, which, however, has now been so deepened by dredging that it can always be crossed by vessels drawing 24 feet[2]; and both these ports, which are more conveniently situated than

[1] As to the value and distribution of Russian industries see a most instructive map in *Petermanns Mitteilungen*, pl. 36, 1913, second half-year, reduced from that prepared to accompany an elaborate report on the trade and industries of European Russia by Benj. Semenov-Tianshanskiy and Nik. Strupp (St. Petersburg, 1903–11), of which an account is given by the late Professor Woeikof in the text.

[2] Works in progress before the war, and expected to be completed in July 1915, were designed to provide a 30-feet channel up to the Admiralty shipbuilding yard on the Ingul, which joins the Bug at Nicolaief.

Petrograd . . .	2,000,000	Odessa . . .	500,000
Moscow . . .	1,500,000	Reval . . .	75,000
Riga . . .	330,000	Nicolaief . . .	95,000

Odessa for the grain exports of south-western Russia, are now rapidly growing, to the prejudice of the last-named port. Among the minor Black Sea ports are Kaffa,[1] or Feodosia, and Kerch,[1] the last of which had at one time a good deal of business in lightening ships before crossing the bar at the Straits of Kerch or Yenikale. The channel across this bar has now been deepened to 24 feet,[2] and at present another entrance to the Sea of Azov is being made by piercing the Isthmus of Perekop at the north of the Crimea. Sevastopol since the latter part of 1899 is solely a naval port. The chief ports on the Sea of Azov are Taganrog, Azof, Rostof, Berdiansk, and Mariupol, this last being the rising port of the Donets coalfield. All the ports mentioned in this paragraph are claimed by U.

918. Astrakhan, the chief Caspian seaport, is the centre of the important fisheries of the Caspian Sea and the Volga (sturgeon, &c.—**507**). As to Archangel, see **904, 912.** Important fisheries are also carried on all the year round **(908)** on the Murman coast, to the north-west of the White Sea, and on the Kanin peninsula to the north-east. Before the war Russian shipping had government encouragement in two forms. Bounties were given on ships built in Russia, and the coasting trade of the whole Russian empire was restricted to Russian ships, except for the carriage of salt from the Black Sea and the Sea of Azof to the Baltic.

919. Among the chief **inland towns** besides those already mentioned are Kief, on the Dnieper, centre of the Russian sugar-refining, and with important leather manufactures; Samara, at the east end of a loop of the Volga, where the river is pushed eastwards by a limestone barrier, long important for its river and eastern land trade, now of rapidly growing importance as situated at the angle of bifurcation of the Trans-Siberian Railway and the line to Orenburg; Saratof, lower down, on the Volga, a centre of the cultivation and manufacture of tobacco; Kharkof, a centre of trade and industry; Orenburg, on the Ural, the starting-point of caravans to the east and south-east.

920. Large periodical fairs are still characteristic of the inland, and even to some extent of the foreign, trade of Russia. The chief are those of Nizhniy-Novgorod (confluence of the Oka and Volga), Poltava, Kharkof, Kief, all three in the south-west (U.). The great fairs of Nizhniy-Novgorod, the most important of which is held annually in August, are international, Asia and Europe there exchanging products. The value of the goods sold at the fair sometimes amounts to about £20,000,000. Irbit, east of the Urals, north-west of Tyumen, is the seat of fairs of great importance to the Siberian fur-trade.

921. Of Russian towns formerly important but now decayed two are mentioned elsewhere—Novgorod, once the centre of a great trade

[1] See below, par. **1006**.

[2] Now being deepened to 28 feet.

Kief . . .	500,000	Kharkof . . .	235,000
Nizhniy-Novgorod .	110,000		

in furs and other commodities (**853**), and the old Tatar capital of Sarai (**1006**). Novgorod, situated on the Volkhof just below its exit from Lake Ilmen, was for hundreds of years—till it was conquered by the Moscow tsars in 1570—the seat of a principality which probably owed its independence, and in a large measure also its commerce, to the safety it enjoyed amid the marshes by which it was surrounded. By the Volkhof, Lake Ladoga, and the Neva it carried on an active commerce with the Baltic long before Petrograd existed. At one time its population is estimated to have exceeded 100,000, but it has now dwindled to a fourth of that number. Sarai has completely passed away.

Finland

922. Finland (**900**) formed part of the Russian empire from 1809 till the overthrow of the empire, and in 1918 it proclaimed itself an independent republic. In 1920 by a treaty with the Soviet government of Russia its territory was extended to the north coast so as to include the port of Pechenga,[1] and in June 1921 the Åland Isles, though inhabited mainly by Swedes, were definitely assigned to Finland by the Supreme Council of the League of Nations. Its inhabitants, mainly Finns, though including Swedes in the proportion of about 10 per cent., are mainly confined to a strip on the south, and even there the density of population is small. The products are similar to those of the neighbouring parts of Russia. Forests of pine and spruce fir cover more than half the area, the state forests in the north extending over nearly 50,000 square miles. The waterways, natural and artificial, fit for boats are estimated to have a total length of about 1,800 miles, besides about 6,000 miles capable of floating timber. Railway connection with Sweden was established in 1919. Manufactures, chiefly of wood work and products of timber, including paper, are rapidly increasing.[2] Large deposits of iron ore are reported in Kolari on the western frontier in 67° 20′ N. The capital and chief port is Helsingfors. Hangö, on the Gulf of Finland west of Helsingfors, has a rapidly growing export trade in butter. Here a large free-port area has been marked out, and is being equipped with the necessary shipping conveniences. The principal ports on the Gulf of Bothnia are Abo, Björneborg, and Vasa. Tampere (Tammerfors) is the principal town in the interior, and is a growing manufacturing centre.

[1] To which place it is now proposed to continue the railway from Helsingfors.
[2] The power-plants increased from 35,000 horse-power in 1885–7 to nearly 320,000 horse-power in 1916.

Helsingfors . .	150,000

SWEDEN AND NORWAY

923. These two countries, which were under one king from 1814 to 1905, may be suitably treated of together, because they both occupy the Scandinavian peninsula, and hence have certain great **physical features** in common. The greater part of this peninsula is made up of a high tableland furrowed by deep and narrow river valleys. The surface of this tableland rises from about 1,000 feet in height in the north to upwards of 3,000 feet in the south, and, as increasing height thus takes away the advantage of a more favourable latitude, it presents everywhere a desolate aspect, almost the only vegetation being heaths, mosses, and lichens. The lowlands of the peninsula are chiefly in the east and south, and hence Norway has by far the largest proportion of tableland; its cultivable lowlands, indeed, are confined to a few valleys in the west, with a rather large area round Christiania Fjord. Hence the total area under crops and grass in Norway, notwithstanding that it has a more favourable climate than Sweden (**56**), is only 4 per cent. of the surface, as against 12 per cent. or more in Sweden; and hence, too, the inferior density of population in the former country as compared with the latter.

924. The **rivers** of the peninsula are for the most part too much obstructed by rapids to be of any great use for navigation, but some of their valleys are long enough and direct enough greatly to facilitate communication between the more populous districts on different sides of the plateau. A railway has been laid from Trondhjem, nearly due southwards, to Christiania, by the valley of the Glommen and the side of Lake Mjösen, which lies to the west of an easterly deviation of the Glommen. Another railway has been laid from Trondhjem eastwards across the tableland, from the eastern base of which it descends south-eastwards to Stockholm. A third railway across the tableland, the Luleå-Ofoten (**928**), is noteworthy as being in a higher latitude than any other railway in the world, the greater part of its route being within the Arctic Circle. A fourth was opened on November 27, 1909. This connects Bergen with Christiania, reducing the time-distance between these places from 54 to 14 hours. It is 492½ miles in length, has 184 tunnels with an aggregate length of 23½ miles, and reaches a level of 3,700 feet. As to the train-ferry connections of the peninsula, see pars. **643, 938,** and note to par. **662.**

925. Though the rivers of the Scandinavian peninsula are of little service to navigation, the **lakes** of the lowland region of southern Sweden are of high importance in this respect. Lakes Vener and Vetter, and

other smaller lakes, together with the navigable portion of the Göta River, are all connected by a ship canal nine feet in depth, and water-communication is thus established between the opposite coasts of southern Sweden.

926. In recent years the rivers have become increasingly important as sources of **water-power.** The total amount of available water-power in Norway is estimated at 7·5, in Sweden at 6·2 million turbine horse power, utilisable for nine months in the year, and this is largely employed in both countries in the manufacture of wood-pulp, carbide of calcium, nitrogenous manures, &c. The Swedish government is acquiring water-powers for the electrification of the railways belonging to the state. In Norway, under an Act passed in 1909, no water-power above 1,000 horse-power is to be granted without the consent of the crown, and then only for a period of 80 years, after which the power and the installations are to become the property of the state. Before the passing of this Act about 750,000 horse-power had already been granted, 450,000 being controlled by foreign capital. Large works for the manufacture of calcium cyanamide have been set up at Odde at the end of a southern arm of the Hardanger Fjord. By another process nitrate of lime and smaller quantities of nitrate of soda and nitrate of ammonia are manufactured at Notodden [1] on Lake Hittendal, south-west of Christiania, and conveyed thence by barges to the seaport of Skien. From the Trollhätten falls on the Göta River power is obtained for the manufacture of chrome steel as well as for electric zinc refining, the ores for the latter industry being obtained from Greece and Australia. Cables under the Sound now convey electrical energy developed from water-power to Denmark. At Sarpsborg, in Norway, to the east of the Christiania Fjord are large works for the manufacture of carbide of calcium, and here also are the first zinc-rolling mills erected in that country.

927. The **products** of the two kingdoms are in some respects similar, and their nature is in some degree illustrated by tables of **exports and imports** in the Appendix. From those tables it will be seen that in both timber forms the most important of the exports. In Sweden, the forests cover about 24 per cent. of the surface; in Norway, about 25 per cent.; and the two countries together furnish about two-fifths of the timber exported by European countries. In Norway 12½ per cent. of the forests belong to the state. The timber is chiefly that of pine and fir, and is valued on account of its hardness and durability, qualities which are due to the closeness of the annual rings in consequence of the shortness of the summers.[2] Wood-pulp for paper-making is among the timber products of growing importance in both

[1] At Notodden 40,000 horse-power are now employed, and 200,000 horse-power are being made available at the Rjukan Fos.

[2] Upwards of 16,000 miles of channels for floating timber have been equipt in Sweden, seven-eighths of them in Norrland, Dalarne, and Värmland.

Sweden and Norway, and in both countries the abundance of wood has also given rise to a large manufacture of lucifer matches. The corn and green crops of both kingdoms are much the same as in Great Britain, but in both parts of Scandinavia oats and barley predominate. In Sweden butter is an agricultural export of great importance. Dairy schools have been established; and it may also be mentioned here, as an illustration of the importance of this industry in Sweden, that the cream-separator is a Swedish invention.

928. The export tables of the two countries reveal in the plainest manner the **mineral wealth** of Sweden, and the extensive development of the Norwegian fisheries. Both countries, it will be seen, import coal, though this fuel is found in Sweden in the part of Scania (Schoonen) adjoining the north end of the Sound. Special attention should be given to the rapid increase of the exports of iron ore and of iron and steel wares from Sweden and that of the imports of coal and coke into the same country. The ore exports are principally from the deposits of Swedish Lapland, close to the railway running from Luleå to the Ofoten Fiord. (See the railway map, European Russia.) There at Gellivare and about 60 miles further north at Kirunavara, Luossavara, and Tuolluvara are the most important and easily worked deposits of iron ore in Europe. They all contain a high percentage of iron, nearly all above 60 per cent., in some cases 68 to 69 per cent.; but while some of the ores are suited for the acid Bessemer process with a maximum of 0·05 per cent. phosphorus, the phosphorus content is mostly high—from 0·6 to 3·5 per cent. By the Luleå-Ofoten railway, opened in July 1903, these ores can now be brought down to the port of Narvik, which is always ice-free. Phosphoric ores are still more abundantly produced at Grangesberg, south-west of Falun, in about 60° 10′, and are exported in large quantity from Oxelösund (in 58° 40′ N.). The seat of the old-established mineral industries of Sweden, however, is in the east of the country on both sides of the Dal River, to the south of which lie the celebrated magnetic mines of Dannemora. In this district there is abundance of iron ore low in phosphorus and suited for the making of first-rate steel, especially when smelted with charcoal (**528**). The increasing import of coal and coke into Sweden not merely betokens the growth of Swedish manufactures generally, but is in keeping with the fact that the diminishing proportion of pig and bar iron and blooms exported is partly accounted for by the increasing proportion of exported iron and steel wares. In the southern mining region Sweden also produces copper, at Falun, west of Gävle, and silver and lead at Sala, west of Uppsala.

929. Of the minerals of Norway already worked, the chief are copper, of which there are valuable mines at Röros in the valley of the Glommen, at Sulitjelma, and elsewhere, and silver, mined at Kongsberg, about thirty miles west of Christiania Fjord; apatite (**571·11** *c*) occurs at various places near Stavanger, and a valuable deposit of

infusorial earth (**571·16***c*) containing from 85 to 95 per cent. of pure silica near the same town. Low grade iron ores are known to exist in great abundance in Dunderland, at the head of the Ranen Fjord, in the province of Tromsö, about 66½° N., as well as at various places further north, including Bogen on the Ofoten Fjord, and here as well as at Sydvaranger, close to the frontier of Finland, great plants have been erected for treating the ore in such a manner as to raise the iron content so that the ore in briquettes and other forms contains upwards of 60 per cent. of iron and little phosphorus.[1] Associated with the iron ores are mines of iron pyrites which account for the growing export of sulphur. Nickel ores are also mined and are refined electrically at Christiansand. Granite and other stones are also largely exported.

930. Bergen, on the west coast, north of 60°, is the centre of the Norwegian herring **fisheries,** and multitudes of the smaller fish are tinned and sold as sardines. The **cod** fisheries are mainly carried on in spring, on a shallow bank surrounding the Lofoten Islands. 'This is the emporium of the North Norwegian, his field and his shop, from which his family and house are supplied, and without it Nordland and Finnmarken would boast few other inhabitants than seals and sea-birds'[2] (**495**). The importance of the whale fishery, including the bottlenose fishery, of Norway is indicated by the export of train oil; but it must be remembered that the local supply of oil for illumination thus obtained is of peculiar value in countries which have such long winter nights as Norway and Sweden. At Bergen, Christiania, and Stockholm, the shortest day is less than six hours long; at Trondhjem and Hernösand, only about four hours. (Comp. **671** and **1058.**) The necessary illuminant is obtained in Sweden by importing mineral oil, but in Norway the home-made train oil enables the inhabitants to a large extent to dispense with the imported article. Train oil, however, is now the basis of important chemical industries. The Norwegians are prominent among those who go furthest afield in this industry, maintaining floating factories for the products.

931. The herring fisheries of Scania on the south-west of Sweden were at one time important, but the fish have long deserted this coast. The Hanseatic League (**853**) during the height of its power claimed for its members the sole right to carry on these fisheries, though they permitted others to have establishments on the coast for the salting and packing of the herrings.

932. The absence of raw cotton from the list of chief imports of Norway shows the undeveloped state of the textile industry in that country as compared with Sweden. The chief industrial towns in the latter country are Stockholm, the capital, Göteborg, and Norrköping.

[1] It is expected that about a million tons will be exported annually. The process for treating such lean ores was invented by Gröndal, a Swede, in 1897.

[2] Sophus Tromholt, *Under the Rays of the Aurora Borealis*, vol. i., pp. 18–19.

Stockholm . .	350,000	Malmö . . .	90,000
Göteborg . . .	170,000		

933. Seaports. The chief seaport of Sweden is Göteborg, the port most directly accessible from Great Britain and France, as well as Hamburg, from which Sweden obtains most of its coffee, and Bremen, from which it obtains most of its tobacco.[1] Malmö, from its situation, naturally has a large trade with Denmark and Germany. Halmstad, on the Kattegat, is a rising port. On the Baltic and its arms, the chief seaports besides Stockholm are Gävle, Oxelösund (**928**), Norrköping, Christianstad, Söderhamn, Sundsvall, Hernösand. Only ruins still testify to the former commercial importance of Wisby (Visby), on the island of Gottland.

Nearly all the towns in Norway of any importance are seaports. The chief are Christiania[2] and Bergen (**930**); among the others are Drammen, the great centre for wood-pulp and paper, Tönsberg, Christiansand, Stavanger, Christiansund, Trondhjem,[3] and in the far north Tromsö and Hammerfest. The shipping table in the Appendix indicates the importance of the wooden shipping of Norway. This seems only natural when we consider the abundance of timber for building-material, the large quantities of bulky produce (timber, ice, salt fish, stones, ores) for which low freight rates are a matter of importance, the large number of good and constantly open harbours on the coast inviting to a sea-faring life, and the scantiness of the means of subsistence on the land, of which there is so small an area available for cultivation.[4] In Norway, however, wood and sail are giving place to steel and steam. The sailing fleet culminated in 1879 with a tonnage of $1\frac{1}{2}$ million tons. Now it is much less than half that and than half the tonnage of the steamers registered in Norway.

934. During the middle ages, when the Baltic trade was exceptionally important (**851**), two Scandinavian islands, Gothland and Bornholm (the latter now in the kingdom of Denmark), became great distributing centres, and both maintained relations with the Byzantine Empire by way of the Black Sea. This trade, in the hands of Scandinavians, attained a special degree of importance at the most flourishing period of the *vikings*, or 'men of the bays,' in the tenth and eleventh centuries, when Constantinople was well known to the Norsemen by the name of Myklagaard, or 'the great city.' The trade that passed thence by way of Russian rivers converged on Wisby in Gottland, which retained its importance in subsequent times during the domination of the Hanseatic League, of which Wisby was one of the leading members. The trade that converged on Bornholm passed down the Oder and its tributaries (**851**), and any products of the regions round the Black Sea

[1] It has quayage with depth alongside up to 30 feet, and a dry dock 410 feet long.

[2] Has a dry dock 570 feet long, capable of accommodating vessels of 15,000 tons dead weight.

[3] Pronounced *Trŏn'yem*.

[4] One-sixth of the population of Norway live on the islands.

Christiania . .	250,000	Bergen . . .	80,000

that followed that route must have been carried up the Danube to the west of Hungary and then to the Oder through the Moravian Gate. The insular position of the two centres of trade mentioned in this paragraph was no doubt determined by considerations of safety, which have so often led to the selection of island *entrepôts* elsewhere.[1]

Spitsbergen

935. This group of islands, somewhat more than 30,000 square miles in extent, formerly a no-man's land, was placed in December 1919 by the Supreme Council of the League of Nations under the sovereignty of Norway, from which it is distant about 400 miles. It has lately attracted attention on account of its mineral wealth. It has extensive deposits of coal of various geological age and of different qualities, including both steam coal (some of it stated to be equal to the best Welsh) and house coal; but in addition to coal it has bituminous shales, magnetic and other iron ores, copper, lead, and coloured marbles. So far only the coal has been worked—by owners of different nationality, British, Norwegian, Swedish, Russian.[2]

[1] In ancient times, Aradus, Tyre (according to Conder as early as the fourteenth century B.C.), Rhodes, Utica (originally), Gades (now Cadiz—originally on an island, though connected with the mainland since Roman times); in modern times Ormuz, Bombay, Hong Kong, Singapore, Diu, &c.

[2] The total export of coal increased from 15,000 tons in 1909 to about 90,000 in 1919. See 'Spitsbergen,' by Dr. R. N. Rudmose Brown, and papers by the author of that work in the *Scottish Geographical Magazine*, June 1919 and April 1920.

DENMARK

936. The islands belonging to this kingdom, namely Seeland, Fyen, Laaland, Falster, &c., between the Kattegat and the Baltic, and the island of Bornholm, further east in the Baltic, are for the most part fertile and well peopled. The eastern half of the peninsula of Jutland likewise contains much fertile land and numerous good seaports, but the western half is largely composed of barren sand-hills, and is bordered by a line of dangerous sand-downs, without any good seaport, though the small seaport of Esbjerg, in the south-west, maintains a trade in cattle with Great Britain. Seeing that so much of the trade of the country is carried on with Great Britain and the western ports of Germany, the importance of having a good port on this side is obvious, and a Danish commission was appointed to inquire into the feasibility of any scheme for providing one. The commission recommended the construction of a ship-canal through the Liimfiord, in the north, and a port at its western end.[1] The channels separating the islands necessarily interrupt to some extent the railway communication, but the railway-trains are ferried across the channel between Seeland and Falster, and in that way the shortest communication between Copenhagen and Germany (Rostock) is effected.

937. The table of exports in the Appendix shows that Denmark is essentially an agricultural and especially a cattle-rearing country. The success of its **agriculture** is undoubtedly due in a very large measure to government encouragement and assistance. The government has taught co-operation among farmers, encourages in every way agricultural education, lowers to a minimum the carriage of farm produce on the state railways (more than half the railway mileage), thus compelling the private railways to follow suit, subsidises the steamers that carry the exports to England and elsewhere, supports land-banks, and so forth. The importance of butter among the exports has made the Danish legislature jealous of the reputation of this commodity, so that it has empowered the Minister of the Interior to forbid the exportation of artificial butter whenever he shall find it necessary. The import table shows how largely Denmark is dependent on foreign manufactures, but the interest taken in the development of local manufacturing industry is shown by the flourishing condition of the Copenhagen Institute for the Encouragement of Danish Industry. During a large part of the

[1] So far (1921) this work has not been carried out.

year the institute holds monthly exhibitions, allotting free space to exhibitors, and promotes Danish industry in other ways. The only Danish manufacturing industry that has a reputation out of the country is glove-making, for which the numerous live-stock of the country furnish raw materal.

938. A country like Denmark cannot be expected to have many large towns, and Copenhagen has a population about ten times as large as any other in the country. Besides being the capital, it is the chief seat of industry and commerce. The Sound, on which it stands, is the shortest route between the Baltic and the Kattegat, and hence the site of the town—partly on the mainland of Seeland, partly on the smaller island of Amager—is well suited for a 'merchants' haven' (Danish, Kjöbenhavn). Since 1894 Copenhagen has been provided with a free port, the harbour belonging to which has a depth up to 30 feet. This port is connected with Malmö in Sweden by excellent train-ferry steamers, and the traffic has grown with great rapidity.[1] Elsinore (Helsingör), at the northern end of the Sound, is of little importance since the Danish tolls collected here on vessels passing through the Sound were abolished by international agreement in 1857. Vessels of the largest size have to make use of the Great Belt (between Seeland and Fyen), the deepest of the channels connecting the Baltic and the Kattegat.

The chief Danish ports on the east of Jutland are Aarhus and Aalborg, the latter on the Liimfiord.

939. The **Faeroe Islands** north-west of Scotland are dependencies of Denmark, and the larger island of **Iceland** still acknowledges allegiance to the Danish crown, although its legislature was made independent by an Act which came into operation on December 1, 1918. The inhabitants of both maintain themselves chiefly by sheep-rearing, fishing, and the collecting of eggs and eider-down. Salt-fish, cod-liver oil, and dairy produce are also exported.[2] The inhabitants of Iceland are only about 70,000 in number, or about $1\frac{1}{2}$ to the square mile. The chief seaport of the island is Reikjavik, on the southern part of the west coast.

[1] In 1895 the tonnage of the vessels visiting the port was 260,000 tons; in 1900, 791,000 tons; in 1911, 3,380,000 tons, of which 1,720,000 with cargo. In 1895–6, the ferry-traffic with Sweden amounted to 5,500 tons; in 1898–99, to 91,400 tons; in 1906, to 357,500 tons. The railway traffic from the free port increased from 52,000 tons in 1895 to 220,000 in 1900, and 319,000 tons in 1907.

[2] Proposals are now entertained for the development of water-power for the manufacture of nitrates.

Copenhagen . .	560,000	Aarhus . . .	60,000

SPAIN AND PORTUGAL

940. The Iberian Peninsula, which is made up of the two countries named at the head of this chapter, has, with the islands belonging to these two countries, an area rather less than twice as large as that of the British Isles, but a population only about three-fifths as great as that of these Islands. This population is chiefly settled round the circumference of the peninsula, so that there remains a large area in the interior with an average density about equal to that of the least densely peopled counties of Scotland.

941. This low density of population is partly explained by the character of the **surface,** which is very mountainous and unfavourable to internal communications. Till 1912 the Pyrenees were crossed by railways only at their ends (**628, 630, 635**), and there a difference of gauge between the French and Spanish lines is maintained as a defensive precaution, but the two countries have now agreed to allow a third rail on the western route so as to have unbroken communication between Paris and Madrid. The Pyrenees are continued westwards by the Cantabrian and Asturian Mountains ; and though the coast on the north is populous and rich in seaports, only five of these seaports, including Corunna, are connected with the interior by rail. A distance of about 43 miles lies between the crossing-places of the two railways through the Basque provinces, namely that which goes to the port of St. Sebastian, and thence to the French frontier, and that which goes to the fort of Bilbao. There is an interval of 62 miles in a direct line between the crossing-place of the latter line, and of that to the port of Santander, a further interval of 81 miles to the crossing-place of the line to Gijon, and one of 84 miles to that which enters Galicia by the valley of the Sil, and then divides, sending out one branch along the Minho, and another north and north-west to Corunna. (See map.)

942. South of these mountains the greater part of the peninsula is occupied by a tableland, with an average height of about 2,700 feet in its northern, and about 2,600 feet in its southern half, and this tableland is bordered everywhere except in the west, by mountains and steep slopes presenting obstacles to railway construction, while the rarity of the population, and in many parts the absence of natural resources, hold out little prospect of remunerative returns on works necessary to overcome these obstacles. At present only two railways descend from the interior of the tableland to the valley of the Ebro. One of these, after threading the famous Pass of Pancorbo and crossing

the Ebro, divides, and sends one branch to the port of St. Sebastian and the French frontier, and a second to the port of Bilbao. The other, after crossing the Ebro at Saragossa, proceeds to the ports of Barcelona and Tarragona. Both of these ports lie to the north of 41°, and on the east side of the peninsula no other seaports are directly connected with the interior till we come to Alicante, which is south of 38½°. The railway along the coast to Valencia is continued south and south-westwards till it joins that which ascends from Alicante more directly to the interior tableland, and this latter line is joined by another which ascends the valley of the Segura from Cartagena, a little further south. The next port directly connected with the interior is Malaga, which is separated from Cartagena by 3½ degrees of longitude. The railway to Malaga is a branch from that which descends from the tableland to the valley of the Guadalquivir (Andalusia) through the Sierra Morena, crossing that range by the Puerto (pass) de Despeñaperros, and which after proceeding to Seville divides again into two branches, one for Cadiz in the south, and one for Huelva in the south-west. The Portuguese seaports of Lisbon, Mondego (Figueira da Foz), and Oporto are also connected directly with the interior tableland, but no others.

943. The **rivers** of the peninsula, though of considerable length (three of them from two to three times as long as the Thames from its source to the Nore), add little to the means of communication. They are for the most part too much obstructed by shallows and rapids to be navigable for any great distance, and as their beds mostly lie in deep valleys far below the level of the tableland, they cannot advantageously be connected by canals. The Minho is navigable for but a short distance above its mouth. The Douro is navigable to the Portuguese frontier, but only by small craft; and a bar at its mouth, crossed only by a narrow, shallow, shifting, and dangerous channel, generally prevents vessels of more than 18 feet draught from ascending even to Oporto. The navigation of the Tagus ends within the Portuguese frontier, and that of the Guadiana only a few miles above the point where it begins to form the frontier between the two countries of the peninsula.[1] The Guadalquivir is the most important of all the rivers of the peninsula as regards navigation. The volume of its water is tolerably constant, being maintained in winter by rain, in summer by the melting of the snows of the Sierra Nevada, the lofty range that borders its basin on the south. It can be ascended as high as Seville by vessels of 1,100 tons, and boats go up to Cordoba.[2] The only navigable river on the Mediterranean side is the Ebro, which allows small

[1] Improvements have been carried out at Pomarão, where the river begins to form the frontier with Spain, with the view of making that place a more convenient port for the neighbouring mines of S. Domingo.

[2] A project is now (1921) on foot for making the river navigable for barges of 525 tons as high as Cordoba, the necessary dams affording the means of supplying water-power.

craft to ascend as high as Logroño, and sea-going vessels to Tortosa. But the lower course of the river can be used by sea-going vessels only during high-water, and a small canal has therefore been cut from Amposta (above the deltaic deposits of the river) to allow of such vessels coming and going at any time. Parallel to the course of the middle Ebro, on its right bank, from a point a little below Tudela to a point about twenty miles below Saragossa, there is a canal, about sixty miles in length, which, though navigable only for vessels of 100 tons burden, is interesting as being, in part at least, one of the oldest canals in Europe. Orders were given for its construction in 1529 by the Emperor Charles V., and it is hence known as the Imperial Canal, but the greater part of it was constructed subsequently to 1768.

944. The **climate** is somewhat unfavourable to density of population, as well as the physical features. The total rainfall of the year in by far the greater part of it is less than twenty inches, a higher rainfall being for the most part confined to the north and west coasts. Such rain as does fall is mostly winter rain, or autumn and winter rain, and the height of summer is a period of extreme drought, especially in the southern half of the peninsula (**621**). The temperature, on the other hand, is high. The whole of the south-east from about the mouth of the Tagus to the eastern extremity of the Pyrenees has at least four months in the year with a mean daily temperature above 68° F., and the whole peninsula, except a comparatively small area in the north-west, has at least eight months with a mean daily temperature of 50° F. or more. The areas belonging to the tableland having the scantiest population are mainly areas of extreme drought and heat—poverty-stricken steppes, in many places covered with a barren soil, and having little other vegetation than the scanty sprinkling of pale-green grasses, herbs, and shrubs characteristic of such a soil. Snow is rare. During a long period of years the average maximum of snowy days at any station was found to be only 22—at a station on the upper Douro.

945. One advantage the climate of the Iberian Peninsula has. The prolonged period of high temperature allows of valuable crops being grown in quick succession wherever water can be obtained for **irrigation.** In some of the plains and valleys at the base of the tableland water has been used for this purpose in the most admirable manner, in some cases since the time of the Romans, in others since that of the Moors. The water of the Ebro is being increasingly turned to account in this way, and that of the Imperial Canal is of more service for irrigation than navigation. The huertas (gardens) of Valencia and Murcia, the former nourished by the waters of the Jucar and Turia or Guadalaviar, the latter by those of the Segura ; the huerta of Elche, in which every drop of the summer waters of the Vinalapo is used up in supplying a grove of date-palms planted by the Moors ; and the vega of Granada, fed by the Jenil, a tributary of the Guadalquivir, are all renowned throughout Europe. At Lorca, in the south of Murcia, 'the water is in the hands

of a large number of proprietors, who may or may not be holders of land, and it is sold by public auction every morning during the irrigating season. . . . Each peasant buys the amount he requires for the day, and pays for it in advance, and the proceeds are divided amongst the various proprietors of the water. The average value of a cubic foot of water per second per annum, in this place, is £2,300.'[1] The total area of irrigated ground in Spain is upwards of 4,400 square miles, more than twice that of the county of Norfolk. By the construction of a large dam on the Noguera Pallaresa near Talarn, about 40 miles north by east Lerida and 80 miles north-west Barcelona, a lake 15½ miles long and 3¾ miles broad has been formed, by means of which it is intended ultimately to develop 40,000 horse-power, and to irrigate about 100 square miles.[2]

946. In the southern parts the irrigated ground is used for the cultivation of vegetables and garden fruits of all kinds—oranges, mulberries, rice, and in some places for maize. Maize, however, is chiefly grown in the rainier provinces of the peninsula—that is, in northern Portugal and the north-west of Spain, where it forms the staple food of the people. The more fertile parts of the Spanish tableland produce excellent wheat, which about ten years ago was an important export, though in recent years the import of this commodity has come to exceed the export both of wheat and wheat-flour. Among the crops more specially characteristic of Spanish agriculture are chick-peas, onions, and garlic. Oranges, the principal sub-tropical fruit of Spain (chiefly the provinces of Castellon—round Burriana—and Valencia) and Portugal, are confined to land at no great distance from the coast. Figs, almonds, cactuses, pomegranates, and carob-trees are also largely cultivated, and in the southern provinces even bananas, cherimolias, and other tropical fruits. Under the protection of favourable fiscal laws, the cultivation even of sugar-cane has been attended with no little (though not unmixed) success in the provinces of Granada, Malaga, and Almeria. As to wine, wool, and olives, see pars. **297, 314, 454** respectively. Cork, the bark of a species of oak which thrives best in a typically Mediterranean climate (**66**), but one with a fair proportion of winter rain, is an important product both of Spain and Portugal. The cultivated groves of this tree are chiefly in the extreme north-east and the south-west of Spain and the southern parts of Portugal. The tree has to stand for thirty years before it yields good cork, and the quality of the cork improves with subsequent strippings, which may be repeated at intervals of about ten years till the tree attains the age, it may be, of 150. Esparto (**311**), on the other hand, is a wild product of the drier parts of Spain.

947. The **mineral wealth** of Spain is very abundant, and has been renowned for ages, though even yet it is far from being fully developed.

[1] Higgin's *Commercial and Industrial Spain*, pp. 92, 93.

[2] Other hydroelectric schemes are contemplated on the Ebro, Segre, and elsewhere.

Iron ore exists in immense quantity in the Basque provinces, and above all in the province of Biscay (Vizcaya). Bilbao, the port from which the ore is dispatched, exports a greater quantity of iron ore than any other seaport on the mainland of Europe. Santander and Murcia rank next in order among the provinces of Spain in the production of iron ore, Cartagena in the latter province being the place of export for valuable ores mined a few miles to the north-east. Large quantities are also mined in the province of Almeria (districts of Almeria and Garrucha) and near Seville, and smaller quantities in that of Malaga (near Malaga and Marbella), and also in that of Lugo in the north-west of Spain, not far from Corunna. All these deposits furnish considerable quantities of ore rich in iron (for the most part from about 48 to 60 per cent.), and sufficiently free from phosphorus to be used in making Bessemer steel by the ordinary process (**534**). Many of the Cartagena mines have a poor iron content, but on the other hand they are mostly rich in manganese, and their phosphorus content is uniformly low. The deposits worked near Teruel in eastern Spain and exported from the port of Sagunto, while rich in iron have a rather high proportion of phosphorus—from 0·06 to 0·39 per cent. While the Biscay deposits, which have been worked from ancient times downwards, are at present the most productive, they are apparently nearest exhaustion.[1] Other parts of Spain (Leon, &c.) possess iron ores of lower quality which may come to be of importance in the future.

948. Lead is obtained at Linares, on the outer slopes of the Sierra Morena, south of the Puerto de Despeñaperros, and also among the mountains to the north-west of the seaport of Almeria. The great copper-mines are those of Rio Tinto, in the west of Andalusia; and Huelva, at the mouth of the river, is the place of export. Silver is found not only associated with lead at Linares, but also in other forms in several other places. Almaden, in the south-west of New Castille, has the principal quicksilver (cinnabar) mines in the world except those of the United States. Zinc-blende and calamine are also among the more important Spanish ores. Coal exists in large quantity, but unfortunately not in many cases in convenient situations, and the production is as yet only small. The total area of the coalfields is estimated at 5,500 square miles, of which about 1,050 square miles belong to the mountainous province of Asturias, or Oviedo, in which are the principal mines. A railway from the centre of the coal-mining region runs to the port of Gijon. Bay-salt is largely produced on the southern coasts both of Spain and Portugal, and rock-salt is also abundant. Near Cardona, in Catalonia, there is an entire mountain of this mineral, and in the same neighbourhood important deposits

[1] In the *Iron-Ore Resources of the World*, which furnishes particulars as to the production of Spanish mines down to 1907, it is stated that 150 million metric tons have been raised from the Bilbao deposits in 23 years, and that only 61 millions are estimated to be left. The total actual iron ore reserve in Spain is estimated at 711 millions of metric tons. Vol. i., pp. xxviii.–xxix.

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of potash salts have been ascertained. The bay-salt produced in the lagoon or estuary of the Sado, in Portugal, and exported from Setubal (the St. Ives of English seamen), which stands at the mouth of that estuary, is recognised as the best salt in Europe. Phosphorite, a valuable manure, is found in large quantity in Estremadura, and is exported to Portugal. (See the railway map.)

949. The situation of the chief seats of Spanish **manufacturing industry** has been determined more by conveniences for commerce than by local supplies of coal or coal and iron. Barcelona,[1] which has long been the chief seaport of Spain, also takes the lead among the manufacturing towns, as Catalonia, the old province to which it belongs, does among manufacturing provinces. Next in importance to Catalonia in this respect are the Basque provinces, where the existence of several seaports has long maintained an active commerce. The abundance of iron ore has developed a large iron industry, especially at and near Bilbao. This rapidly growing industry has led to a great increase in the import of British coal, and as most of the ships that take away the ore still come in ballast, it is likely that this will lead to a still further development of the manufacturing industry and the corresponding import trade. The water-power of the Cantabrian Mountains is likewise used in driving modern machinery. The smelting and manufacture of iron are also largely carried on in the province of Oviedo in the neighbourhood of the coal-supplies, and to that province belongs the government factory of artillery, &c., at La Trubia (a few miles west of the town of Oviedo). The southern seaports of Seville, Malaga, and Cartagena have all risen into important seats of industry of various kinds.

950. Among locally characteristic industries may be mentioned esparto-plaiting, carried on in the provinces which produce this grass, and silk-spinning and weaving in Valencia and Murcia, where the silkworm is principally reared. Toledo, on the Tagus (one of the old capitals of Spain), is still noted for the sword-blades which in former times made the name of the city almost the synonym for a sword. The leather industry, so renowned when the Moorish kingdom of Cordova was at the height of its glory, has now declined.

951. The tables of **imports and exports** in the Appendix show among other things the great and growing importance of the Spanish cotton industry. This is almost entirely concentrated in and round Barcelona, and it is characteristic of the Spanish industry, unlike that of Russia, that it is mainly carried on by a large number of comparatively small establishments. The increasing import of machinery is an indication of the industrial development now going on in Spain generally. Spanish commerce as a whole, it will be seen, is growing vigorously, even since Spain lost her foreign possessions in 1898. Cuba remains an important though declining market for Spanish exports, but Spanish imports from

[1] For town populations see p. 451.

Cuba since that date have sunk to insignificance, Cuban sugar, tobacco, metals, &c., now going mainly to the United States.

952. All the chief **seaports** are named on the map, pp. 448–9, and from this may also be learned which of them have direct communication with the interior. Those which have the best natural harbours are Barcelona, Cartagena, Malaga, and the ports on the west coast of Galicia. The harbour of Barcelona, protected by the fort of Montjuich, has been made deep enough to admit the largest vessels, and quays for the accommodation of these have been provided (first in 1755) at the suburb of Barceloneta. The harbour of Tarragona has been artificially formed at some distance from that of its ancient Roman predecessor. The harbour or roadstead of Cadiz, which, together with the position of the town at the entrance to the fertile valley of Andalusia, made this a seaport in the earliest times, is accessible to the largest vessels, though the dock accommodation is defective. The harbour of Huelva, though wide and deep enough to accommodate a large fleet of the largest vessels, is unfortunately obstructed by a shifting sandbar at the mouth of the Rio Tinto.[1] The opposite port of Palos is historically interesting as the place of departure of Columbus on the voyage in which he discovered the New World. Seville has been made a seaport for large vessels, and is maintained as such only by dredging. All the ports on the north coast are liable to be obstructed by bars, due to the accumulation of sand caused by a current which creeps eastwards along the coast. The importance of the port of Bilbao has led to the expenditure of large sums of money to remove this defect. The river Nervion, on which Bilbao stands, has been canalised, and the depth of water on the bar increased to an average of twenty-four feet at spring tides, nineteen at neap tides ; but this has been effected only by making the navigation channel extremely narrow and difficult. Improvements at the port of Pasajes (east of San Sebastian) have led to the development of a considerable import trade in coal. Vigo is an excellent and well-situated coaling port.

953. The chief seaport of Spain in most periods of history has been one having for its hinderland the basin of the Ebro, in that part of the country which contains the most vigorous and energetic part of the population ; but, owing to the physical conditions already mentioned at the mouth of that river, it has never lain either on the Ebro or its delta. In Roman times the main outlet and inlet of this hinderland was Tarragona, or *Tarraco*, as it was then called, originally a Massilian foundation ; but this city was destroyed first by Goths and afterwards by Arabs, and, its harbour having been allowed to be silted up, the port fell into decay. Barcelona, another ancient city, with comparatively easy access to the Ebro valley by way of Lerida, then came to the front, and during the middle ages, from about the eleventh century, was one of the chief seaports by the Mediterranean, specially

[1] A channel of 24 feet in depth at mean low water is maintained through this bar.

celebrated in the history of commerce for its code of commercial law (*Consulado del mar*) of 1229, and for the Catalan map of 1375. The discovery of the New World gave for a time greater importance to the Spanish ports on the Atlantic, above all, in the end, to Seville, which in 1501 was made the sole seaport for transatlantic trade. Twelve galleons proceeded thence annually to Portobello, on the isthmus of Panama, and after 1547, fifteen to Vera Cruz to bring back thence the treasures of the New World. The Crown of Spain claimed for itself one-fifth of the precious metals produced by the mines of the 'New Indies,' and these royal treasures were stored in Seville in the Torre del Oro, or 'tower of gold.' The export from Spain even of the gold and silver belonging to private merchants was forbidden, a policy which is recognised by economists from the seventeenth to the twentieth century as having been the ruin of Spanish industry. Causing prices to rise higher in Spain than elsewhere, it rendered the people of Spain unable to manufacture so cheaply as the inhabitants of other countries.

954. The chief Portuguese seaports on the west coast are Oporto, Lisbon,[1] and Setubal; on the south coast, Faro and Olhão. A new harbour for Oporto, admitting vessels of 5,000 tons, has been constructed at Leixoes, three miles north of the mouth of the Douro, in order to avoid the bar at the mouth of the river already referred to. The estuary of the Tagus forms an admirable natural harbour for Madrid (410 miles distant by rail).

955. Madrid owes its importance solely to its being the political capital of Spain and to its central position. Valladolid is the chief centre of trade for the northern half of the Spanish tableland.

Madrid	650,000	Cartagena	100,000
Barcelona	620,000	Bilbao	100,000
Valencia	250,000	Granada	80,000
Seville	165,000		
Malaga	140,000	Lisbon	440,000
Murcia	135,000	Oporto	200,000
Saragossa	125,000		

GIBRALTAR

956. Gibraltar,[2] a fortress on a commanding rock at the east of the strait of that name (at this place nearly 13 miles, at its narrowest about 8 miles wide), has been in the hands of the British since 1704. The Spaniards complain of the smuggling alleged to be carried on across the British frontier, but this evil is now greatly reduced. Commercially Gibraltar is important as a free port and coaling station, and it has docking accommodation for the largest vessels in the British navy. Large cold stores have been erected.

[1] As to the former commercial importance of Lisbon, see **814**.
[2] Civilian population (1911), 19,000.

ITALY

957. Area, surface, and communications. The area of Italy is about one-twelfth less than that of the United Kingdom, but the population more than one-fifth smaller. The density of the population is thus less on the whole, but is nearly everywhere high. Enclosed on the north and north-west by the Alps, and washed almost everywhere else by the sea, the country has well-defined natural boundaries. The hindrance to communication presented by the Alps and the nature of the communications now established across and through this barrier have already been considered[1] (**823**); but here it may be added that the route across the Stelvio Pass (in German Stilfserjoch), upwards of 9,000 feet in height, connecting the head of the valley of the Adda with the western part of the Trentino, across which runs by numerous sharp windings the shortest carriage road between Milan and Vienna, is still followed by no railway. Many passes across the Apennines, which are continuous with the Alps in the north-west, and stretch through the entire peninsula, have facilitated the construction of railways, and, as is shown on the map, pp. 396–7, there are now several lines completed or in progress connecting the principal railways on opposite sides of the peninsula. These last, it will be seen, keep for the most part close to the coast-line, that on the east being continued along the south coast to Reggio, on the Strait of Messina. On the eastern side the railway, running northwards, forks at Rimini, and one main line proceeds north-westwards, with remarkable directness, till it crosses the Po at the old bridge-town of Piacenza; passing through a number of old towns of more or less note, Forli, Faenza, Imola, Bologna, Modena, Reggio, each lying at the outlet of a valley of the Apennines (**194**). This railway-line marks pretty well the boundary between the foot-hills of these mountains and the great plain which stretches between them and the Alps. The other main line still keeps near the coast as far as Ravenna, and then sweeps round the low and marshy region extending from the delta of the Po to the mouth of the Reno, crosses the Po near Ferrara, and passes through Padua to Venice. The marshy region just referred to includes the lagoons called the Valli di Comachio, which are of importance for their production of bay-salt and their eel-culture.

958. The navigable **rivers** of Italy are nearly all confined to the great northern plain. The Po is navigable for boats to Turin, for steamers to Valenza, seven miles below the confluence of the Sesia;

[1] The construction of the railway shown on the map as in progress across the Maritime Alps connecting Cuneo and Nice involves the piercing of two long tunnels, the completion of which has been delayed by the war.

the Ticino is navigable from its issue from Lake Maggiore; the Adda from its issue from Lake Como, the Adige from a little below Bozen in the Tirol, the Bacchiglione from Vicenza, the Brenta from Padua. In the peninsular portion of the country the only navigable rivers are the Arno and the Tiber, the former being navigable by boats to Florence, the latter by steamers to Rome, and by smaller boats sixty miles higher up.

959. The **climate** of Italy has the characteristics of that of the Mediterranean in general, but if we make a comparison with Spain and Portugal, it is important to observe that Italy lies further north than the Iberian Peninsula, that the Italian Peninsula is narrower, and that the surface is more irregularly mountainous. Whereas nearly half of the Iberian Peninsula lies to the south of 40° N., in Italy the only parts to the south of that line are the southern half of the Island of Sardinia, the whole of Sicily, and portions of the smaller peninsulas of the mainland. These southern portions of Italy have a climate like that of southern Spain, and in particular are distinguished by the same degree of drought in the summer months. The greater part of Italy, however, is blessed with a much greater rainfall than Spain, for whereas in Spain the edges of the tableland serve to cut off rain to a large extent from the interior, the mountains of Italy promote the rainfall, especially since they descend to the sea on both sides. Even the plain on the north of the Apennines is not deprived of rain through the intervention of these mountains, since the rain-bearing winds are forced to ascend still higher by the loftier ranges of the Alps. The glaciers of these mountains likewise help to maintain the volume of the innumerable streams which descend from them, and thus increase the supply of water for **irrigation,** which has been carried out on a more extensive scale in Italy than anywhere else in Europe. The irrigated area in the Po basin is about equal in size to the counties of Lincoln and Norfolk combined. The largest of the Italian irrigation canals is the Cavour Canal in Piedmont.[1]

960. Extensive tracts of the lowlands of Italy suffer greatly from malaria, the Tuscan Maremme, the Roman Campagna, the Pontine Marshes in southern Latium, the shores on the west side of the Gulf of Taranto, and the Sardinian plains being the most severely stricken areas. Considerable ameliorations have, however, been carried out by means of drainage and other works, and the discovery of the connection between mosquitoes and the propagation of malarial fever (**127**) has led to further steps being taken for the preservation of health in the infected districts. The Maremme, the Pontine Marshes, and the Roman Campagna have all benefited by such operations, the part of the Campagna lying to the north of Rome having been completely transformed. The plains round Verona have also been reclaimed, and by means of a huge pipe under the Panaro (completed in 1899) the whole area between

[1] In southern Italy irrigation problems, with which must be associated those of water-power development, are only now beginning to be studied.

the embankments of the Po, the Secchia, and the Panaro (including the marshes below Ferrara) is now drained into the Adriatic.

961. Altogether, the climate and soil of Italy are sufficiently good to allow of the existence of a large population directly dependent upon **agriculture.** The area occupied by corn-crops is about twice as great as in the United Kingdom, over and above the area under vineyards, olive-yards, fruit-trees, sugar-beet (increasingly cultivated since 1890), flax (cultivated almost solely for the seed), and hemp (especially in the provinces of Ferrara and Bologna), pasture-grasses, &c. The principal corn-crop is wheat. It covers from four to five times as great an area as in the United Kingdom, but the only Italian wheat that is noted for its quality is that of Apulia, in the south-east, where there is grown a hard wheat well adapted for making maccaroni. Maize, the second Italian corn-crop in extent of acreage, furnishes the chief food of the people throughout a large part of the country (266). As the maize that falls to the lot of the poorer classes is often mildewed, the use of this standing dish is blamed as the cause of a disgusting disease known as pellagra, very prevalent among the Italians. In northern Italy very great advances in agriculture have been made in recent years by the introduction of the rotation of crops and of chemical manures, and by the spread of agricultural education.[1]

962. The Italian production of raw silk (reputed the best in the world), rice, wine, olives, oranges, and figs is referred to elsewhere; but here it may be added that oranges and other citrus fruits and their derivatives are so important in Sicily as to make up more than two-fifths of the value of the exports from that island, that rice is the most valuable crop of the irrigated fields in the north, and that the production of wine is extending most rapidly in the southern parts of the country, above all, Sicily. Most Italian wines are ill-prepared, so that they deteriorate instead of improving with age. Among those in best repute are Marsala, grown in the west of Sicily; Chianti, grown in the higher parts of Tuscany to the south of Florence; and Asti, grown on the southern slopes of the Piedmontese hills to the west of Alessandria.

963. The grass and forage crops of Italy are very important in the irrigated plains. The meadows are regularly mown four times a year, and in some peculiarly favoured districts as many as nine crops have been known to be reaped in a single year from the same field. The richness of these meadows leads to a large trade both export and import, calves being largely imported from the Tirol and Switzerland and returned or exported to France as fat cattle. But besides this export of cattle there is a large import of milk-cattle from Switzerland, these imported animals yielding a larger quantity of milk than the native breeds. When fed on irrigated meadows for ten months in the year Swiss cows produce 700 gallons of milk, as against about 550 gallons

[1] See *Econ. Jour.*, vol. xii. (1902), p. 83 (in a review of F. S. Nitti, *L'Italia all' alba del Secolo XXmo*).

produced by the native cows. This large produce of milk gives rise also to a large trade in cheese. The famous Parmesan, Gorgonzola, and Stracchino cheese are all made in the plains of Lombardy, the first-mentioned, therefore, not, as its name would indicate, in the province of Parma.[1] The rearing of poultry is likewise characteristic of the agriculture of northern Italy, and to this cause we owe not only the large export of eggs, but also fowls, for poultry form the next item in value to cattle under the head of animals exported. Italian eggs now even reach England. Apulia, besides being noted for its wheat, is noted for its wool. The sheep of this province are migratory like those of the Spanish tableland, wide tracts being reserved for their migrations along the regular routes.

964. Minerals. The Sicilian sulphur (**571·10**), produced chiefly in the neighbourhood of Caltanissetta, Girgenti, and Catania, is the most important mineral product of the kingdom. It is next in importance to citrus fruits among the exports of the island. Iron ore of excellent quality is obtained in the island of Elba (**534**), and is exported chiefly to the United Kingdom. Ores of the same metal are worked in the Val Trompia, in Lombardy (between the lakes Iseo and Garda), and in the island of Sardinia. Lead and zinc are important products of this island (the south-west round Iglesias). Tuscany produces among the Apuan Hills in the north the celebrated statuary marble of Massa and Carrara.

965. In a volcanic district in the south of Tuscany boracic acid escapes from the ground in the form of vapour, and the acid is concentrated in water and then solidified. The chief centre of this industry is Larderello (23 miles west by south of Siena), where the vapours have been used to heat engine boilers since 1897, and since 1912 to develop electric energy, which is transmitted to, among other places, the iron and steel works of Piombino, and the copper pyrites mines of Massa. Mineral fuel exists chiefly in the form of petroleum, of which there are wells in the Emilian Apennines (chiefly in the province of Piacenza), and lignite (**510**), the chief centres of production of which are Castelnuovo (prov. Arezzo) and Spoleto (Umbria).

966. Italian **manufactures** have developed in recent years with remarkable rapidity, even those dependent on power-driven machinery in spite of the dearness of coal.[2] The chief local advantages to set

[1] In territories, however, that once belonged to the Duchy of Parma.

[2] Coal is imported chiefly from England, and there is accordingly a good deal of significance in the following comparison of the average pit-mouth prices of coal per ton in the United Kingdom and import prices in Italy (at 25 lire to the £). The year 1896 was the year of minimum, 1900 that of maximum, prices in the United Kingdom in the period 1889–1901. In spite of the high price in 1900, the quantity of coal imported in that year (nearly 5,000,000 tons) was greater than ever before.

	1896		1899		1900	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
United Kingdom . .	5	10¼	7	7	10	9¾
Italy	16	9½	24	9½	33	6

against this disadvantage are the density of population furnishing abundance of labour and a large local market, the abundance of water-power, and in some cases, more particularly in that of the chief textile industry (silk), the abundance of the raw material. Italian labour is not only abundant, but it is excessively cheap, for certain kinds of work apparently the cheapest in Europe in proportion to efficiency.[1]

967. The water-power capable of being utilised in Italy is estimated at upwards of 3,000,000 horse-power, and with the aid of electricity this is being steadily made more available.[2] Manufactures are, however, also artificially stimulated by protective duties under the tariff of 1887, modified to some extent, for those countries which enjoy the benefit of most favoured nation treatment, under the commercial agreement with France of 1899.

968. The manufacture of silk yarn by the operations of throwing and twisting is the chief Italian manufacturing industry connected with silk (**346**), an industry making use not merely of the valuable raw material produced at home, but also of large supplies from abroad. The weaving of silk by power-looms is now, however, rapidly developing, chiefly at the expense of the French industry.[3] The principal centre of this industry is Como, where there is a flourishing school in connection with it. Cotton manufactures have grown with equal rapidity, and are likewise now taking a high place among the exports. The spinning branch of the industry is producing yarns of increasing fineness. Woollen manufactures are of considerable importance for home consumption. If one place may be singled out from others in which the woollen industry is concentrated, it is the small town of Biella, in an Alpine valley in Piedmont, where the industry, having first been fostered by the abundance of the raw material, had attained a position of importance by the middle of the fourteenth century. Cotton, linen, iron, earthenware, and leather manufactures have since grown up at the same place. Schio and Pordenone, near the base of the Alps in Venetia, are among the places in which textile factories have been established

[1] It is the cheapness of Italian labour and the unsatisfactory conditions at home, of which that cheapness is the sign, that lead to such a large annual temporary as well as permanent emigration (considerably more than 100,000 under each head). The temporary emigration is to a large extent of labourers in bodies under contract (**111**), but the emigration law of 1901, which suppresses emigration agents, is apparently designed to put a stop to this.

[2] In 1900 about 300,000 horse-power was estimated as being already effectively utilised; on the 30th of June, 1911, the amount of horse-power conceded was 956,000, of which more than a third was in Lombardy. (For later estimates see the table of Water-powers in the Appendix.) At the industrial census held on the 10th of June in the same year the total amount of power employed in Italian industries was returned at 1,574,000, of which water-power thus made up about 60 per cent. At Piano d'Orta, on the Pescara, the power derived from that river is utilised in a very large installation in the manufacture of carbide of calcium in the first works erected for the production of nitrolim.

[3] In the last ten years of the nineteenth century the value of the Italian exports of manufactures of pure silks increased more than three-fold, while that of the imports (now less than one-fourth of that of the exports) considerably diminished.

in the east, and the former has the advantage not only of water-power, but of a supply of lignite in the vicinity (at Valdagno).

969. The iron industry has been specially encouraged in recent years by the Italian government with the view of making itself independent of foreign countries. Till lately the only important blast furnaces in Italy were those of Follonica, Cecina, and Piombino for smelting the ores of Elba, but in 1899 a company was formed to start large blast furnaces on Elba itself (at Portoferraio). Besides these there are a few small charcoal furnaces at the base of the Alps in the provinces of Bergamo and Brescia. A speciality of the Italian iron industry is the refusion of old iron, which is imported for the purpose from all parts of the world. This industry is carried on chiefly on the Ligurian coast not far from Genoa. Large steel works have been established at Terni, where advantage is taken of the enormous water-power furnished by the falls on the Nera, a left-bank tributary of the Tiber, and where there is the further advantage of a supply of lignite at Spoleto, a few miles distant. Other important steel-works are carried on at Milan and Savona.

970. A considerable amount of iron and steel shipbuilding is carried on not only in the government arsenals at Spezia, Venice, Castellammare and Taranto, but also by private (including some foreign, English, and other) firms under a system of bounties begun in 1885. Cannon are made not merely in the royal arsenals, but also in the private works of Armstrong at Pozzuoli. One of the most remarkable developments of recent years has been the making of motor cars and motor-car bodies, an industry largely carried on in Turin and other northern towns, where a great deal of water-power is employed in the industry.

971. The characteristic manufacturing industries of Italy, however, are mainly those of an artistic or semi-artistic nature. The glass-works and the lace industry of Murano, an island town to the north of Venice, have long been noted, though these industries have both declined. Florence produces fine earthenware and mosaics; Naples, Florence, and other towns are noted for their works in coral (**496**) and shell (cameos), and many Italian towns for their sculptures in marble and alabaster and their artistic woodwork. Milan is the chief seat of Italian cutlery. Tuscany is well known for its straw-plaiting (**616**). The growth of Italian leather industries is leading to an increasing import of hides from India.

972. The leading features of Italian **commerce** are exhibited in the tables in the Appendix, but it may be noted as one of the striking peculiarities of the foreign commerce of this country that the chief articles of export are sent abroad by land, notwithstanding that the country has such a large extent of seaboard and many good ports. The reason of this is obvious. The products of the northern provinces, silk, wine, oil, eggs, cheese, straw-plaiting, and even the products of the motor-car industry, &c., are not merely sent more cheaply to their principal

destinations by an all-rail route than by one which involves a transhipment at two seaports, but all these commodities[1] are of fairly high value in proportion to their bulk, and accordingly such as suffer a relatively small increase of cost in railway transport. The circumstance here referred to is prejudicial to some extent to Italian shipping, inasmuch as it causes the imports at the principal seaports of the mainland greatly to exceed the exports, and hence makes it difficult for vessels both to land and ship a cargo at the same port. See additional notes at the foot of the table in the Appendix giving Countries of Origin and Destination.

973. Besides Rome, the capital, the chief **inland towns**[2] are Milan, Turin, and Florence. Rome owes its pre-eminence more perhaps to historical than to geographical circumstances; but its situation is not without geographical advantages, some of which must have been of more importance in early times. It lies about midway between the extremes of the kingdom, on the chief river of the peninsula (**958**). Its chief port is Civitavecchia.

974. Since 1905 Rome has been the seat of the International Agricultural Institute, located since 1907 in the Villa Borghese. Its aim is to collect, arrange, and publish as quickly as possible all kinds of statistical and other information concerning agriculture, with a view to steadying the trade in and promoting the production of agricultural commodities in all parts of the world. Monthly bulletins in Italian, English, and French began to be issued by it in January 1910.

975. Milan, the former capital of Lombardy, became at a very early date a great seat of trade, chiefly in consequence of its central position in one of the most fertile parts of the northern plain. The Alpine passes approached by the roads along the banks of Lakes Maggiore and Como confer additional importance on it, and this importance has been further enhanced by the St. Gothard railway. It is the centre of the trade in silk, a great seat of silk and other industries, and is noted for its cutlery. Turin (Ital. *Torino*), the former capital of the kingdom of Sardinia, for a short time of the kingdom of Italy, is situated on the Po, where it passes round the base of a bastion of the Apennines, and just in face of the valley of the Dora Riparia, which leads up to two of the most frequented Alpine passes of the middle ages, the Monte Genevra and Mont Cenis passes. It is the valley now traversed by the Mont Cenis railway on the eastern side of the Alps. Florence (Ital. *Firenze*), the chief town in Tuscany, lies at the head of the most considerable and fertile plain of that province, closely

[1] Of the imports from Italy into the United Kingdom in 1912 only 52 per cent. came direct, about 30 per cent. through Belgium, and 18 per cent. through France. In that year carriages and parts of carriages formed by far the most valuable import from Italy into this country, and only an insignificant proportion came direct. The great bulk came through Belgium. The Italian commodities that came direct to the United Kingdom are mainly such as are produced to the south of the Po basin.

[2] For the populations of towns see p. 464.

begirt by hills. It occupies a position of peculiar importance as a meeting-place of trade-routes. The greater portion of northern Italy, including all that part on which the Alpine passes from the Simplon to the Brenner descend, communicates most easily with all southern Italy by the route passing through Bologna and Florence. In the middle ages this route led due south across La Futa pass (under 3,000 feet). Now the railway passes up the valley of the Reno, then south by way of Pistoja, and on that railway trains are to be seen containing trucks that have passed through both the St. Gothard and the Brenner tunnels. Moreover, from its situation at the head of the fertile plain of the Arno it brings all that plain into connection with places beyond the mountains in different directions. The commercial advantages arising from this situation at an early date developed manufactures for which the sheep pastures of the Maremme (on the coast of Tuscany) supplied raw material. The wealth thus created led to the development of banking, which had risen to considerable importance in the city as far back as the thirteenth century. Bologna: see **957.**

976. Susa stands at the fork of the passes leading from the upper part of the valley of the Dora Riparia west of Turin, the Monte Genevra pass leading thence south-westwards to the mouth of the Rhone valley, the Mont Cenis north-west up the Rhone valley. In the middle ages two other passes were of importance in relation to Turin, those, namely, branching off at Aosta at the upper end of the valley of the Dora Baltea, the little St. Bernard leading westwards to the Isère and thus to the Rhone valley, the Great St. Bernard to the Rhone valley in the Swiss canton of Valais above the Lake of Geneva. Trent and Bozen (**875**) are the two principal towns in the recently ceded territory of the Trentino, somewhat similarly situated to Susa and Aosta, Trent Italian speaking, Bozen German. Trent stands at the point where an easy road eastwards leads to the Val Sugana, the upper part of the valley of the Brenta, by which the Brenner route in past times was brought into communication with Venice, an interesting memorial of which is found at Trent in the palace of the Fuggers, the great Augsburg merchant family of the sixteenth century. A railway now follows the same route, but one quite inadequate for any considerable traffic.

977. In order of rank the principal Italian **seaports** now, as they were in the middle ages, are Venice and Genoa, but as regards the value of their commerce they are both only shadows of their former selves. Of the two, Venice is first in the value of its exports, but Genoa in the value of its imports, which is three or four times that of its exports. Venice (Ital. *Venezia*), the chief port, not only for the eastern part of the northern plain, but also for the traffic of the Brenner railway, stands, as is well known, on numerous islets in a lagoon guarded by a line of low sand islands. Through this barrier

there are two channels, the Lido in the north and the Malamocco in the south, which have been made deep enough for the largest vessels. Venice is one of the few places belonging to the Mediterranean basin at which there is a sensible tide; and since the construction of long piers at the Malamocco Channel the scouring action of the tide has been so much increased that the channel has been deepened from about 16 to about 30 feet, and the adjoining part of the lagoon has likewise steadily increased in depth. Chioggia is the port at the south end of the lagoon to which Venice belongs.

978. Trieste, at the head of the Adriatic, a town which is mainly Italian in language and was annexed to Italy at the close of the war, must, if it is to regain its prosperity, once more serve chiefly as a seaport for a large part of central Europe,[1] as it was under Austrian rule (**646**). In the early middle ages it was subject to Venice, and to escape from that domination it voluntarily submitted to Austria (under the Babenburgs) in 1382. Its most prosperous period began about 1719, when it was made a free port. In 1832 it became the seat of the Austrian Lloyd, which was at first like the English Lloyd's, merely a shipping registration company, but in 1836 was reorganised as a shipping company. Pola on the west coast of Istria, formerly an Austrian naval station, has been turned into a commercial port. As to Brindisi and Taranto see **633** and **634**.

979. Genoa (Ital. *Genova*[2]) has the advantage of a fine natural harbour, but the growing commerce has necessitated improvements and enlargements. A commercial port with a depth of 26 to 40 feet has also been established on another Ligurian inlet, the Gulf of Spezia, the chief Italian naval station, but this port has the disadvantage of difficult communication with the interior. For centuries Leghorn (Ital. *Livorno*[3]) has been the chief seaport of the valley of the Arno and the whole of Tuscany. Naples (Ital. *Napoli*), the most populous town in Italy, has a deep and spacious harbour enclosed by moles. At this port also the imports, consisting mainly of cereals and a variety of manufactured articles, are of three or four times the value of the exports, among which the chief are animals and animal products, hemp and flax. Fiumicino, founded in 1825, a little to the north of the mouth of the Tiber, is one of the ports of Rome, but does not rival the older but more distant port of Civitavecchia ('Old Town'). The port of Civitavecchia is an artificial creation, and the harbour is still in need of improvement. Vessels of 18 to 22 feet have to be moored at the breakwater and lighter till their draught is reduced to 18 feet.[4]

[1] It is already (1921) proposed to run direct trains from Cracow to Trieste.
[2] Pronounced, however, *jen'oa*.
[3] Pronounced *li-wor-naw'* (last syllable short).
[4] The creation of a great port at Ostia, the ancient harbour of Rome, is projected, but Ostia is only now (1921) getting connected with Rome by rail.

For the populations of towns see p. 464.

980. Palermo, the chief Sicilian port, has not so good a harbour as its ancient predecessor *Panormus*, the modern town, in consequence of a rise of the coast, covering part of the site of the ancient harbour. Dredging and blasting are now being carried on to deepen the present harbour. Most of the Sicilian ports export large quantities of oranges and other fruit. Palermo is also the chief place of export of Sicilian sumach and manna. Messina exports large quantities of wine-lees; Marsala is the chief place of export of wine; Girgenti, Licata, and Catania are the chief ports for sulphur. For the names of other seaports see the map, pp. 396–7.

981. Geographical influences in the Middle Ages. The high value of the commerce of Venice and Genoa in the past was in a large measure due to the enormous profits earned by those who were successful in the trade in the relatively high-priced commodities derived from the East, above all pepper and spices (**1006**). Venice and Genoa were so situated as to serve as the principal intermediaries in that commerce for a larger proportion of the population of the plains of northern Italy than any other ports. For Venice, the immediate hinderland was (and is) the eastern part of those plains; for Genoa it was (and is) the western part of those plains. Both, however, had an important extension of those hinderlands beyond the Alps. In the case of Venice the trans-Alpine markets were mainly reached either by the Brenner or the Reschenscheideck (**875**). The Brenner route, including the section below Innsbruck emerging on the high plain of Bavaria to the north of Ratisbon, gave the most direct access to southern Germany and all the territories reached by the rivers of the Elbe basin, and thus brought the Baltic generally into communication with the east by way of Lübeck (**851**). Both the Brenner and the Reschenscheideck brought Venice into connection with the Rhine valley, and so with the ports of the North Sea, but in both cases a second pass had to be crossed before Augsburg was reached (**875**).

982. The trans-Alpine markets of Genoa were reached mainly by Milan (**867**), and above all by the pass-routes (of which there are several) descending the Rhine valley from Coire to the head of the Lake of Constance. All these routes brought Milan into connection both with the Rhine and Elbe basins through Ulm, with that of the Elbe also through Augsburg. In the later middle ages the more direct north route across the St. Gothard was also frequented, and for the north-west the Simplon route was also important. Other trans-Alpine markets were reached by way of the passes converging on Turin (**976**), but for these markets Genoa had a rival both in Savona and the ports at the mouth of the Rhone valley (Marseilles and Narbonne). From the early part of the fourteenth century a large part of the trade of Venice and Genoa with the Low Countries and through them with other North Sea and with Baltic ports was carried on by sea—by the so-called 'Flanders galleys.'

983. Venice owed its origin and early rise solely to the fact that during the first period of its history an easily defended situation was a matter of the first consequence. The islands in the lagoon in which it stands were settled in 452 by refugees from the port of Aquileia at the time of its destruction by the Huns. Aquileia, now an inland village, with a harbour long ago silted up, then had much the same importance as a port of the Roman empire that Venice had in later times as an independent republic. The refugees of 452 were reinforced by others fleeing before the Lombard invaders of 568. The islands on which that city now stands were settled in 810, and shortly after that date Venetian ships were known in the eastern waters of the Mediterranean. Its commerce increased rapidly after the Venetians (about 990) conquered the coasts of Istria and Dalmatia and put down the pirates by whom those coasts were infested. In later times Venice had numerous factories in the Levant and territorial possessions were acquired there both by the state and Venetian families. The trade both of this city and of Genoa was greatly extended by the crusades. The fourth crusade, in particular, which was diverted by the Venetians from its main purpose and resulted in the capture of Constantinople in 1204, was the principal cause of the acquisition of territory both by Venice and Venetians. Crete was in the possession of Venice from 1206 to 1669. Not till 1338 was any territory acquired by Venice on the mainland of Italy. For a long time Chioggia was a rival of Venice, and no doubt the greater security of the situation of Venice greatly contributed to its final triumph. At all times the mudbanks of the lagoon have been a hindrance to communication with its hinderland, but in former times this was a minor consideration, especially since the streams entering that lagoon, the Brenta and Bacchiglione, afforded an entrance to that hinderland for small boats. In modern times this hindrance is overcome by the long railway bridge connecting Venice with Mestre, but now the growth of the port is greatly cramped by the smallness of the site afforded by the Venetian islands. The population already existing there is accommodated only by building to a great height the houses that border the canals and the narrow foot-paths.

984. Genoa dates from Roman times, but has always suffered from the fact that the Apennines have hindered its communication with the most populous and productive part of its hinderland. On the other hand, this drawback is counterbalanced by the fact that there is no rival that does not suffer from a similar disadvantage, as well as by the fact that the Apennines are here at their narrowest and not very high, and that the roads across or through them lead directly to the most populous part of the north Italian plains with Milan for their centre. The pass formerly used in crossing the Apennines, the Bocchetta, is under 3,000 feet in height. Now two railways (both, however, with heavy gradients) connect Genoa with the plains through mountain

tunnels. The commerce of Genoa began to be really flourishing in the eleventh century. The rivalry between it and Venice led to prolonged and repeated hostilities between the two. They inflicted on each other severe losses and injuries, but the commerce of both continued to flourish as long as the geographical conditions to which that commerce was due continued. Notwithstanding the existence of two railway tunnels through the mountains behind, the progress of the port has been retarded of late years chiefly in consequence of the fact that these railways are not able to handle with sufficient rapidity the growing imports of coal and other bulky commodities.[1] Savona, the neighbouring rival of Genoa, had in past times the advantage of a lower pass across the mountains behind, namely the Col dell' Altare, which is taken as marking the limit between the Alps and Apennines, and has a height of only 1,600 feet; but this advantage, even joined with that of a shorter route to Turin (now nine miles shorter by rail than that from Genoa), has never served to outweigh the fact that the district thus connected with Savona is much smaller, less populous, and less productive than the hinderland of Genoa.[2]

985. Pisa, the seat of a powerful republic from the eleventh till near the end of the thirteenth century, from 1405 a Florentine port, was the chief outlet of the valley of the Arno, till it was replaced by Leghorn. Even at the time of the acquisition of Pisa by Florence its port had been nearly silted up, and in 1421 Florence purchased Leghorn from Genoa, and by repeated improvements its artificial harbour has been adapted to modern requirements, while Pisa has long been an inland town, important only on account of its memorials of the past.

986. The populousness of Naples answers to the extraordinary productiveness and proportionate density of population of the adjoining plain now mainly comprised in the provinces of Naples and Caserta. For its size this small plain is probably without a parallel in Europe in fertility, and it has had a high degree of importance from this cause from very early times. It was no doubt this fact that caused the Greeks to found on the coast of this plain one of the oldest of their Italian colonies, that of *Kyme*, the Latin *Cumæ*, the mother-city of Naples.[3] In the most troubled period of the middle ages, the chief seaports in this part of Italy were the Lombard city of Salerno and the independent city of Amalfi[4] on the south side of the rocky peninsula to the south of the Bay of Naples. From the sixth to the early part of the twelfth century Amalfi was particularly important, and there can hardly be a doubt that its commercial importance was largely due to

[1] On that account it was resolved in 1912 to pierce a large new base-level tunnel.

[2] At present there is an active party in Piedmont advocating the connection of Turin with Savona by a shorter route with easier gradients than the present. See an interesting article on Piedmontese railways in the *Annales de Géog.*, xxiii. (1914), p. 365.

[3] Greek, Neapolis—'New City.'

[4] Amalfi, like Venice, owned a nominal allegiance to the Byzantine Empire.

its relations with this plain to the north, whether those relations were maintained by land (as they could be only with difficulty) or by sea. The fact that its situation made it quite secure against attack on the land side must have formed at that time an important advantage. From the later middle ages down to the present time Naples has, however, always been the one great port for this plain, and down to 1860 its populousness was enhanced through its being the capital of a kingdom.

Populations of Communes.

Naples	700,000	Catania	220,000
Milan	660,000	Bologna	190,000
Rome	600,000	Venice	170,000
Turin	450,000	Messina	150,000
Palermo	350,000	Leghorn	110,000
Genoa	300,000	Bari	110,000
Florence	240,000	Padua	105,000
Trieste	230,000	Ferrara	100,000

MALTA

987. Malta and Gozo are two densely peopled British islands to the south of Sicily. Valetta, on Malta, is an important fortress, coaling station, and *entrepôt*. The prevailing language is a debased Arabic, that of the upper classes Italian, though English is spreading. Responsible self-government in all local affairs was granted to the islands in 1921. Early potatoes are the chief commercial product, but oranges, cotton and cotton seed, hides, cummin seeds and squills are also exported.

FIUME

988. By the treaty of Rapallo, which was ratified by the Italian government in December 1920, Fiume, at the head of the Gulf of Quarnero, east of Istria, was accorded a position similar to that of Danzig. As a port it was a Hungarian creation, though only the minority of its population is Magyar, the bulk of the inhabitants being either Italians or Slavs. Like Trieste, it must depend for its future prosperity on the maintenance of its relations with its former hinderland, now divided among the kingdoms of Yugoslavia, Hungary, and Roumania.

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THE BALKAN PENINSULA[1]

989. Under this name we include the greater part of the region lying to the south of the Danube and Save. Together with the adjacent islands belonging to Greece and to European Turkey (and among these Crete), the total area is about one-fourth larger than that of the United Kingdom. Though the area thus marked off forms, in spite of great diversities in physical features, climate, and products, an easily recognised geographical unit, the latest political settlements have made it more convenient to treat large portions of it elsewhere. For Yugoslavia see pars. **893-5**; for the Dobruja see par. **898.** European Turkey, Bulgaria, and Greece, in addition to the principality of Albania, entrusted by a mandate under the League of Nations to Italy, are the political areas which remain to be considered here.

990. The population, except near the chief towns and on some of the islands, is scanty. The surface, including that of the islands, is highly mountainous, the most considerable extent of lowlands being those which border the Danube in the north of Bulgaria. The Save and the Danube form an important line of communication on the north (**881**). The other rivers of the peninsula are of little importance for navigation, and the irregularity of the surface throws great obstacles in the way of inland communication by roads and railways. As to the natural connection of the area with the Danubian plains, see par. **881,** and as to the rail connections with the Adriatic see **895** note and below, par. **998.**

991. In view of the difficulties of the ground and the paucity of the population, it seems likely that these railways will long remain the only through lines between the north-west of the peninsula and the Ægean. The railway up the valley of the Vardar has, indeed, been continued north-westwards across the Shar Dagh as far as the Ibar River in Novibazar, but beyond that the difficulties are in the meantime too great to hold out the prospect of a speedy connection with the railway that has already been constructed up the valley of the Bosna to Sarajevo. A carriage-road made by the Russians has since 1879 crossed the Balkans at the Shipka Pass (4,000 feet), but the descent from this pass on the southern side to the rich isolated valley of Kaz-

[1] See M. J. Newbigin, *Geographical Aspects of Balkan Problems* (London, Constable, 1915); Cvijic, *La Péninsule Balkanique* (Paris, Colin, 1918), with maps showing the physical features, the migration currents in the Serbian region from the fifteenth century downwards, the distribution of Yugoslavian types, and the ethnography and religion of the peninsula.

anlik is rather abrupt for a railway. The railway which now connects the lower Danube by way of Trnovo and Nova Zagora with Adrianople crosses the Balkans, as will be seen from the railway map, further east. Notwithstanding the peninsular character of this region, and its southerly latitude, the climate, except that of the islands and the small peninsulas of the south, is, in accordance with the easterly position, one of great extremes. In summer the temperature is as warm as in Italy, but in winter by far the greater part of the peninsula has more than a month of mean daily temperatures below the freezing-point. The districts in which such temperatures prevail longest are naturally those northern plains and high valleys which are more or less directly exposed to the cold winds from Russia. Even at the port of Salonika the mean minimum temperature is as low as 22° F.[1] See also par. **886.**

[1] In January, 1903, the shores of the Gulf of Salonika were frozen. See *Petermanns Mitteil.*, 1903, p. 91.

1. EUROPEAN TURKEY

992. At the time of the Congress of Vienna in 1815, European Turkey embraced the whole of the Balkan Peninsula except the Dalmatian seaboard and the small principality of Montenegro, and included also the pre-war Roumania. Successive losses of territory have reduced it to a small area to the north and north-east of the Sea of Marmora and the Dardanelles. It thus still retains the important city of Constantinople, the site of which is of peculiar historical and geographical interest. As described by D. G. Hogarth, it lies 'on the southern extremity of a peninsula, whose landward part is all rough hill country, rising northwards to an isthmus, and then falling steeply almost to sea-level again. A continuous wall of broken shaggy heights faces Europe, approaching at either end so nearly to the sea that it can hardly be turned without command of that element. This wall . . . carries the now famous lines of Chatalja. Its strength has been increased by deliberate policy, which has converted the lands both behind and before into almost uninhabited forest.' [1] The roughness and, it may be added, the aridity of the hill country immediately behind the city is, no doubt, the explanation of the fact that its fine harbour, 'the Golden Horn,' was so long in acquiring importance in ancient times, and that the settlement of Chalcedon on the opposite coast came first. It required a strong government to develop through this harbour the remoter but rich hinderland formed by the valley of the Maritsa beyond the wall. As the seat of an empire it had enormous commercial advantages as the crossing place of the sea-route between the Black Sea and the Mediterranean and the land routes through western Asia and the territories north of the Mediterranean. Its present commercial importance lies largely in its being an *entrepôt* for Asiatic produce, and is likely to increase with the establishment of good government in and the development of the resources of Asia Minor, if these things can be brought about.

[1] *Geog. Journal*, vol. xlv. (June 1915), p. 460.

Constantinople	1,000,000

2. BULGARIA.[1]

993. The modern Bulgaria began as a principality confined, except round Sofia, to the area north of the Balkans in 1878, when it was withdrawn by the treaty of Berlin from direct Turkish rule, although remaining tributary to Turkey. Eastern Roumelia, south of the Balkans, was added in 1885. Its complete independence as a kingdom was proclaimed in 1908. After the wars of 1912–13 its territory was extended southwards to the Ægean so as to include the seaport of Dede Agach, but the settlement at the close of the great war handed this territory over to Greece. About four-fifths of the population are Bulgarian in speech, but of the remaining fifth a large proportion are Greeks, between whom and the Bulgarians there is bitter hostility. The Greeks are found mainly in the towns. Several towns on the Black Sea are entirely Greek, and there are other considerable Greek groups in the Maritsa plain and on the lower Tunja.

994. The northern or Danubian tracts of the kingdom are mainly composed of irregular tablelands cut by deep and narrow valleys. The surface, being mainly composed of argillaceous loam or lœss spread over a calcareous subsoil, has a somewhat arid appearance, having no dense covering of trees or rich pastures, except in the depressions. The Balkans, though containing fine forests of beeches and oaks, are full of clearings and rich in valleys surrounded by fields of barley, rye, buckwheat and potatoes, as well as fine meadows. To the south again, in the upper valley of the Tunja, are extensive plains covered with wheat and maize, varied with vineyards, tobacco and sugar-beet plantations, orchards of plums and peaches. Here also are the famous rose-gardens of Kazanlik, which produce the costly perfume known as attar (or otto) of roses. The Maritsa basin proper is characterised by numerous isolated depressions, where cold air is apt to accumulate in winter, forming 'frost-pockets,' so that the more delicate fruit-trees are forced up to the slopes with a good exposure and good air-drainage. Bulgaria is essentially a land of small cultivators and small proprietors, 87 per cent. of the owners possessing less than 40 acres each, and not one per cent. owning as much as 250 acres. Coal of good quality is mined at Pernik, south-west of Sofia, with which it is connected by rail. Promising beds of oil shale exist at Brezna, west by north of Sofia.

[1] See the article by A. Demangeon in the *Annales de Géographie*, No. 162 (Nov. 1920).

The chief towns are Sofia, the capital, in an isolated basin in the west, Philippopolis, on the Maritsa, Trnovo, north of the Balkans, the capital of the old kingdom of Bulgaria, which reached the height of its prosperity about 1000 A.D., and the Black Sea ports of Burgas and Varna. As to the commerce of the kingdom see the tables in the Appendix.

Sofia . . .	100,000	Philippopolis . .	50,000

3. GREECE.

995. When first made a kingdom in 1830 Greece had an area of less than 25,000 square miles, but successive enlargements, principally in 1913 and 1920, have extended its territory[1] to more than double that. But these later extensions of territory have added a larger proportion of aliens in language and religion than of Greeks to the kingdom, at least on the mainland, the added area of 1913 being mainly occupied by Macedonian Slavs and Turks, that of 1920 mainly by Turks. From Salonika southwards, however, the population is mainly Greek. Crete, and the islands of the Ægean Sea, all of which, except Rhodes, now belong to Greece, are all mainly Greek in speech.

996. Most of the older Greece is mountainous, the most extensive plains being in Thessaly. A ship canal, opened in1893, has been cut through the isthmus of Corinth, but has not answered expectations. Its narrowness, less than 100 feet at the surface, and the strength of the current which sometimes flows through it, cause foreign steamers to avoid it. Other hindrances to navigation have been removed by the making of a navigable channel 16½ feet deep between the island of Levkas and the mainland (west side), and the widening of the Evripos channel at Chalkis on the opposite coast to 70 feet.

997. The climate of the whole country is typically Mediterranean, its characteristics becoming more and more pronounced towards the south. That accordingly determines the nature of its **agricultural products**. Cereals are negligently cultivated even in the areas best adapted for them, Thessaly and Macedonia. About half the land is always in fallow. The extension of the cultivation of currants to a maximum in 1889 was due chiefly to the use of this fruit in wine-making. The large areas of olive groves then devoted to the currant vine are now being reconverted to the slow-growing olive. Cotton gives large yields near Levadeia in Bœotia, and this forms one of the crops in the neighbouring reclaimed area formerly occupied by L. Kopais. There are also successful works of the same nature in the plain of Messenia, and these successes encourage schemes now entertained for the drainage of the Vardar and Struma valleys in Macedonia and Thrace. The chief **minerals** of the country are the silver-lead and manganiferous iron ore of Laurion (at the south-eastern extremity of Attica), the iron ores of the island of Seriphos, and the chrome ore of

[1] If the Treaty of Sèvres (August 10, 1920), which detached Thrace from Turkey in favour of Greece, holds good.

Thessaly. Among the minor minerals of the country is the celebrated statuary marble of the Island of Paros. The honey of Hymettus (to the east of Athens), so celebrated in ancient times, is still an important article of commerce.

998. At the latest period to which the tables of imports and exports refer, Greece was still a country which had no rail connection with any other, so that maritime countries had the advantage. The United Kingdom still led decidedly both among the despatching and receiving countries. The fact that Trieste and Fiume, both at that time Austro-Hungarian ports, are two of the nearest great ports helps to account for the high place then occupied by that empire. The growing prosperity of Germany was reflected in its increasing importance as a consuming country. The decline in the position of France among the destinations is explained by what is mentioned in the previous paragraph.

999. Athens, the capital of the country, remains now, as it was in ancient times, the most important town, and its port, The Piræus, is the fourth port in the Mediterranean. Patras, in the Gulf of Corinth, has long been the great place of export of currants, and has become a great centre of emigration. Volos, the outlet and inlet of Thessaly, has since 1910 been rendered safe by the construction of a breakwater. Salonika is the inevitable port, not merely for the recently added portion of Greece, but also for eastern Yugoslavia. It has an important carpet industry. The chief inland town is Adrianople at the confluence of the Maritsa and the Tunja, the natural centre of the Maritsa basin, though no longer in a central situation politically.

Syros, or Hermoupolis, on the island of Syros, among the Cyclades, is a free port, and on that account as well as on account of its excellent harbour and central situation in the Ægean is a great place of call for vessels trading with the Levant.

Athens . . .	170,000	Piræus . . .	75,000

4. ALBANIA

1000. The principality of Albania is a rugged territory, about one-half larger than Wales, to the north-west of Greece, inhabited by a people quite distinct from the rest of the population of the peninsula, who have nearly always maintained virtual independence, whoever may have been their nominal suzerains. At the close of the great war Italy was made the mandatory power over it. Its coast line includes the bay of San Giovanni di Medua with a good anchorage in the north, the port of Scutari at the mouth of the Boyana, which is, however, accessible only to small vessels, the ports of Durazzo and Valona, and the good anchorage of Butrinto Bay. Valona or Avlona is the best natural harbour and one that is capable of improvement, but it suffers from the natural difficulty of communication with the interior, so that any railway laid there would have to run northwards to join the route of the ancient Egnatian way from Durazzo to Salonika, passing to the north of Lakes Okhrida and Prespa and before reaching Lake Okhrida crossing the Radohoja Pass at the height of 3,600 feet.

ASIA

1001. Asia is the largest and most populous of the continents, but its population is very unequally distributed. Though, taken as a whole, Asia has a much smaller population relatively to area than Europe (about 46 as against 90 to the square mile), four countries in the south-east of Asia, namely India, Java, China, and Japan, with an aggregate area equal to about five-sixths of that of Europe, have a population about twice as great as the population of that continent. The explanation of this difference in the distribution of the population is to be found mainly in differences of climate ; and these differences, again, are due to situation and superficial configuration.

1002. The vast size and the shape of the continent necessarily have the effect of placing the central areas at a great distance from the sea, the chief source of moisture ; but it is to be noted that the existence of another continent continuous with it in the west, and a third lying to the south-west, has an important bearing on the climate of Asia. The European continent receives, to the loss of Asia, the bulk of the moisture brought by south-west winds from the North Atlantic Ocean, and the continent of Africa has a detrimental effect on the Asiatic rainfall in two ways. First, being situated in latitudes in which there is great rarefaction of the air on the land, and consequently a strong indraught of air from the sea, it diminishes the influx of sea air into the neighbouring parts of Asia (**52**). Secondly, it prevents such sea-winds as do blow over the south-west of Asia from being as heavily charged with moisture as otherwise they would be. Hence it is that the monsoons (**64**) begin, we may say, to the east of the Indus, and hence, too, that these seasonal winds are so all-important in relation to the climate and production of Asia.

1003. The **superficial configuration** of the continent intensifies the contrast between south-eastern and central Asia. The Himalayas, the loftiest mountain range in the world, arrest the summer monsoons of India, or at least deprive them of nearly all their moisture. North of these mountains, the tableland of Tibet, varying from about 10,000 to 18,000 feet in height, spreads out northwards to the Altyn Tagh and Nan-Shan Mountains, and on the east and south-east breaks up into numerous mountain ranges, which also help to deprive the southern monsoon of moisture. Still more effectually deprived of this essential of life are the lower tablelands to the north, varying from about 2,200

to upwards of 4,000 feet in height, and extending to the mountains of Siberia and central Asia.

1004. Climate. Outside of the monsoon region there is probably not one million square miles, or, say, only about one-tenth of this section of the continent, in which the total rainfall of the year amounts to as much as 16 inches. The areas in which that amount is exceeded lie chiefly in the parts traversed by mountains in the south-west (western Persia, Caucasia, and Armenia, Asia Minor) and in Siberia, in the middle and upper parts of the basin of the Yenisei, and in that of the Ob from about lat. 56° to 62°.

1005. In the drier parts of the continent there are various proofs that at one time the climate was moister than it is at present, and in some of these districts the population was in consequence at one time more numerous. The Sea of Aral is rapidly diminishing in size. Lake Sari-Kamish, once a lake of 4,400 square miles in extent, between that sea and the Caspian, is now divided up into three separate lakes, the aggregate area of which is less than 200 square miles. A series of maps dating back to the year 1784 show that within the last hundred years or so the lakes between the Irtish and Ob about 55° N. have all shrunk in dimensions, in some cases from an area of 300–500 square miles to groups of small ponds one or two miles wide. In the basin of the Tarim (Eastern Turkistan) numerous ruins and old river-courses testify to the fact of there having been in that region a much greater extent of habitable and inhabited land in former centuries than there is now. In the Thar, or Indian Desert, there are likewise beds of rivers long dried up, seeming to show 'that the waters of the Indus, or of some of its branches, once flowed through it, fertilising what is now a wilderness.'[1]

1006. Trade routes between Europe and south-eastern Asia. The monsoon region in the south-east of Asia has, however, from the very dawn of history been a populous and productive part of the continent, and its commodities have been all the more valued in Europe from being the products of a warmer climate, and hence of a different nature from those native to the west. Indian spices, drugs, and dyes, and Chinese silks, together with precious stones, have been eagerly sought after by European merchants since the time of the Romans, and some of them found their way to the Mediterranean even in early Biblical times (Genesis, xxxvii., 25). The favourite routes by which these commodities were exchanged for European goods differed at different periods. In the time of the Romans Egypt was the transit

[1] Hunter's *Gazetteer of India,* 2nd ed., xiii., p. 262. How far such changes may be taken to indicate a more or less continuous process of desiccation is very uncertain. See on this subject the articles by Professor J. W. Gregory under the title 'Is the Earth drying up ?' in the *Geographical Journal,* vol. xliii. (February and March, 1914, more particularly with regard to central and western Asia, pp. 293–8 in the March number), and the reply by Dr. Ellsworth Huntington in vol. xliv. (August 1914).

land for Indian and other eastern products, and it was in a large measure this circumstance that gave to Alexandria its ancient commercial importance. In the time of Justinian (sixth century A.D.) the Persians had the monopoly of the silk trade. Chinese silks were received either at ports on the Indian Ocean, or by land routes through the Tarim basin by Yarkand, and the Pamir and Kashgar, and the Terek or other passes across the Tian-Shan Mountains. About the middle of the seventh century the overthrow of the Persian dynasty of the Sassanidæ by the Mohammedans destroyed the Persian monopoly of the eastern trade. Soon the Red Sea route came to be preferred once more for eastern commerce, though it had a rival in the Persian Gulf. By the former route the eastern goods were sometimes landed on the western shore of the Red Sea and carried to Cairo or Alexandria; sometimes they were conveyed across the Isthmus of Suez; and sometimes from ports on the eastern shore of the Red Sea through Syria. By the Persian Gulf route, which attained a high degree of importance in crusading times (the twelfth and thirteenth centuries), commodities reached the Mediterranean by Damascus or Aleppo. In the fourteenth and part of the fifteenth century another route was much frequented—that, namely, through the southern portion of what is now European Russia. That region was then in the hands of Tatar tribes, who for a time maintained friendly relations with the merchants of Italy. The Venetians and the Genoese had colonies on the Black Sea and the Sea of Azov. The Genoese were long established at Kaffa (now again called Theodosia or Feodosia) on the southern shore of the Crimea. Both had colonies at *Vosporo* (now Kerch) at the entrance to the Sea of Azof, and at *Tana* (now Azov) on the Don. From Tana the rivers afforded access to the interior of Russia. Valuable furs, besides grain and forest products, were the principal commodities obtained in this trade, but long inland journeys were also pursued. An eastern route to Astrakhan might be followed, or the traders might ascend the Don to the angle at which it approaches the Volga and thence go eastwards through the Tatar capital of *Sarai* (on the Akhtuba arm of the Volga about 45 miles east of Tsaritsin), then round the north of the Caspian to the valley of the Amu, and up that valley across the Bamian Pass through Kabul to India, or across the Amu and the Sir, and then by way of Dzungaria to China. Early in the fifteenth century the Black Sea and Caspian routes became greatly hampered through political events, and the fall of Constantinople in 1453 finally restored to the Syrian (Persian Gulf) and Egyptian (Red Sea) routes all their early importance for eastern traffic. This they retained till the discovery of the sea-way to India, at the close of the century. The opening of the Suez Canal in 1869 has been the means of restoring the early pre-eminence of the Red Sea route. The rapid increase in the amount of commerce carried on by that canal is shown in the table in the Appendix. To British shipping and commerce in particular this

canal has been of the highest consequence, through the opening of shorter sea-routes to India and other eastern dependencies of the empire, as well as to Australia. It is true that the canal has at the same time again enabled Mediterranean sea-ports to supply themselves directly with many eastern commodities which they formerly received indirectly from London and other British ports ; but it is noteworthy that, as shown in the table in the Appendix exhibiting the proportion of British export trade in foreign and colonial products, the Suez Canal traffic has not yet had much, if any, effect in diminishing the aggregate value of the commerce for which Great Britain is the intermediary.

COUNTRIES OUTSIDE OF THE MONSOON REGION

1007. SIBERIA. This region, composed mainly of a vast plain in the north and west, and of tablelands and mountainous country in the east and south-east, and extending in all over an area of nearly 5,000,000 square miles, has been gradually acquired and colonised by Russia since the close of the sixteenth century. Deported criminals and political offenders at one time formed a large element of the population, but free settlers are arriving from Russia in greater and greater numbers. These settlers are chiefly Russian peasants, whose principal inducement to emigrate is the hope of obtaining larger pieces of land in place of the small holdings (many of them less than twenty acres in extent) into which most of the peasant properties of Russia are parcelled out. The total Russian population of Siberia amounted at the census of 1897 to nearly 5,000,000, two-thirds of whom were in Western Siberia, which is, roughly speaking, synonymous with the basin of the Ob (divided into the provinces of Tobolsk and Tomsk). The native population amounted at the same date to about three-quarters of a million, of whom little more than one-sixth inhabited Western Siberia. Outside of that region the settlers are mainly confined to the neighbourhood of the chief roads and the borders of the rivers. The chief native tribes are the Kirghiz and Buryats, both of which form a compact population, with all the signs of enduring vigour.

1008. The first Russian conquest beyond the Urals was made in 1581 under a Cossack leader called Yermak. The expedition was primarily in the interest of a family of Russian fur-traders, but it received the sanction of the Russian government, and politically was merely a continuation of the process of expansion by which the grand princes of Moscow gradually drove back or subjugated the Tatar invaders of the thirteenth century. The immediate result of the first invasion of Yermak was the fall of the Tatar capital, *Sibir* on the Irtish, about ten miles above the present Tobolsk, which was founded soon after. Small parties of Cossacks, living the life of backwoodsmen, gradually pushed eastwards along the rivers, and in little more than fifty years after the conquest of Sibir a blockhouse was erected (1632) on the present site of Yakutsk on the Lena. Before the close of that century the Russians had come in contact with the Chinese on the Amur, but a pause of about 150 years took place in their eastern expansion, after they had in 1689, in the treaty of Nerchinsk, relinquished

all claim to the Amur. Further expansion in this direction took place during the Crimean war, and in 1858 the Chinese agreed in the treaty of Aigun to recognise the Amur and Usuri and a line drawn from the head of the Usuri southwards to Korea as the Russian frontier. In 1898 the Russians obtained from the Chinese a lease of the extremity of the Liautung peninsula, but after the war with Japan in 1904–5, this lease passed to Japan.

1009. Agriculture is the principal occupation of the people, and grain has already risen to the rank of the chief export. The whole of the southern belt as far as 60° N. is described by Russian authorities as being more or less fit for cultivation, though large parts of this tract will first have to be cleared of forests, and other areas are at present marsh-land. The districts traversed by the westernmost section of the Siberian railway in about 55° N. are first level afterwards rolling prairies similar to those of the Canadian north-west. The prairies on the banks of the upper Yenisei, in the district of Minusinsk, are said to vie in fertility with those of the Red River valley, but are even yet too remote from any great market to be settled largely by wheat-growers (**1013**). The whole of Western Siberia appears to have an even better **climate,** latitude for latitude, than the Canadian north-west, at least as regards temperature. The curves showing the monthly mean temperatures for Omsk and Irkutsk very nearly coincide with that for Winnipeg in Manitoba, all three rising with remarkable regularity from a minimum of between —3° and —6° F. in January to a maximum of between 65° and 69° F. in July, and falling with corresponding regularity in the second half of the year. In making this comparison it should be noted that Irkutsk (lat. 52° 16′ N., altitude 1,540 feet) is nearly $2\frac{1}{2}$ degrees further north and 800 feet higher than Winnipeg, and that Omsk, though about 500 feet lower than Winnipeg, is 5 degrees further north. Semipalatinsk, which differs little from Winnipeg in latitude or altitude, has a curve rising from 0° to 74° F. The great drawback of the climate is that which it shares with Manitoba through lying, as described in par. **242,** on the margin of adequate rainfall. There is consequently a great variation in the amount of the produce from year to year, the crops of cereals in a good year being about three times as heavy as in a bad year. In Western Siberia the chief cereal is wheat. Rye and oats are largely grown in all the settled districts. North of this cultivable region the chief products are those of the forests, including furs (**485**), and still further north lie the tundras, in which the only article of value in commerce is the fossil ivory referred to in par. **491.**

1010. The **mineral wealth** of Siberia is likewise very abundant. Siberia produces at least three-fourths of the Russian gold, and two-thirds of the Russian silver, the chief goldfields being at the present time in the east—in Transbaikal, in the basin of the Amur, and in that of the Olekma, a right-bank tributary of the Lena. These gold-

fields are mainly alluvial, and owe their preservation in a large measure to the ground frosts that have held them bound since the Ice Age. All the gold of Siberia has to pass through the government laboratories of Irkutsk, Tomsk, or Ekaterinburg, and thence to the mint at Petrograd. Silver is produced chiefly in the Altai region. Graphite abounds in the mountains in the south of the Yenisei basin, but owing to the competition of other more accessible sources of supply **(571·14)** this mineral is now little worked. The country also contains enormous deposits of iron ore,[1] lead, and copper, besides coal. One coalfield, that of the Kuznetsk basin, containing also iron ore, and partially covered by forests, covers an area of upwards of 16,000 square miles in the upper part of the basin of the Tom. Other coal deposits are found in the far east in the Amur province, and it is there that the greatest production of coal takes place. In that region also are deposits of iron ore. A little coal has been mined in the northern or Russian half of Sakhalin.

1011. The chief obstacle to the commercial development of Siberia has been the deficiency of **communications**. The great navigable rivers, the Lena, Yenisei, and Ob, draining into the Arctic Ocean, and the Amur, draining into the Pacific Ocean (Sea of Okhotsk), afford with their numerous navigable tributaries a large extent of waterways. To complete the line of water communication between Lake Baikal and the Urals, a canal has been made in about lat. 59° N. connecting the basins of the Yenisei and Ob, and the railway to Perm across the Urals now begins at Tyumen, the limit of navigation on one of the western tributaries of the Tobol. But this route is impeded by rapids on the Angara, the outlet of Lake Baikal; it is stopped by ice for five and a half or six months in every year; it is at best a very circuitous route; and, lastly, it carries the principal products of Siberia to a land which abounds in similar products, and in which, accordingly, they have a smaller value than they would have elsewhere. On this account it is especially unfortunate for Siberia that its chief navigable streams open into seas so long closed by ice that it is extremely difficult to establish communication by sea with their mouths. Since 1874 repeated attempts have been made by English, German, Danish, and other seamen to utilise this route for commerce with the west of Europe, but were for a time abandoned. Interest in this route was, however, revived in 1911, and since then several successful voyages have been made, the difficulties of navigation being reduced by providing the vessels with wireless apparatus and the establishment of three wireless stations in or near the Kara Sea. This sea is open for only 6 weeks in August and September, but that time has been found sufficient to allow of ships of upwards of 1,500 tons dead weight to carry out

[1] According to the estimate of *The Iron Ore Resources of the World*, however, the total reserves of iron ore in Siberia amount to only about 27 million metric tons, containing less than 15 million tons of metallic iron.

European manufactured goods to be exchanged for butter, flour, wool, hemp, linseed, hides and furs.[1]

1012. But the most important means of communication in Siberia is now formed by the Trans-Siberian Railway. The first stone of the railway was laid at Vladivostok on May 19, 1891, by the Grand Duke Nicholas, afterwards Tsar Nicholas II., and the line then began was ultimately continued northwards to Khabarovsk on the Amur. The westernmost section, Chelyabinsk to the Ob, was opened in December 1895, and the next section to Irkutsk was opened in the summer of 1898. Originally the line was intended to follow the valley of the Amur down to Khabarovsk, but the difficulties of construction in the easternmost section of this route, together with the small prospect of economic development in that region, led with the consent of China to the change of route through Manchuria. The line was continued eastwards to Sryetensk or Stryetensk, at the head of navigation of the Shilka, but the railway to the seaboard was made to branch off at Manchuria, 177 miles by rail above Sryetensk. It thence runs south-eastwards to Harbin in Manchuria, and from Harbin south to Port Arthur and Dairen, and east to Nikolskoye on the Vladivostok-Khabarovsk line. The line was completed before the end of 1902, except for a break at Lake Baikal. For some time trains were carried across Lake Baikal in large ferry-boats, but before the end of 1904 the very difficult section round the south end of Lake Baikal was completed. The total length of the railway from Chelyabinsk to Port Arthur is 4,102 miles, to Vladivostok, 3,902 miles, from Moscow by Samara, Ufa, Zlato-ust and Chelyabinsk to Port Arthur 5,475 miles, from Petrograd, 5,882 miles. By connections completed in 1906 Petrograd is brought by Vyatka, Perm, Ekaterinburg and Chelyabinsk within a distance of about 5,500 miles from Vladivostok, 5,700 from Dairen, and 6,000 from Peking by Niu-chwang and Tien-tsin.[2] The railway in Eastern Siberia running mainly to the north of the Amur valley from Kuenza on the Shilka a little below Chita to Khabarovsk was begun as a result of the Russo-Japanese war, which caused the control of the Manchurian railway to pass out of Russian hands. It attains its summit level in a tunnel through the Nuksha range at the height of 2,030 feet, and in the neighbourhood of that tunnel the winters are so rigorous that most of the rivers and marshes are frozen solid, but further east at a lower alti-

[1] Successful voyages were made between Great Britain and Siberia in 1913, 1915, and 1919. In August 1921 a fleet of four British vessels, carrying mixed cargoes of 13,000 tons in all, set out on this voyage from Murmansk.

[2] See on the Trans-Siberian Railway, *For. Off. Report, Miscel. Ser.* Nos. 533, 585. The whole line is now being doubled. The construction of the section down the Amur to Khabarovsk was in progress just before the war, as was also a branch from the head of L. Baikal to Kiakhta. Another important project was the construction of a branch from Tulun on the Iya 242 miles by rail north-west of Irkutsk, north-eastwards across the Angara and Ilim to the Lena, so as to connect the navigation of that river with the railway—a branch bound to be of great importance for the gold-mining industry.

tude and in a latitude three or four degrees further south the wide Zeya-Bureya plain already presents to the eye in summer wide-stretching wheat-fields on both sides of the line. In Western Siberia the railway gradients are naturally easy, nowhere as far as the Ob exceeding 1 in 135. Further east they rise to 1 in 66, and additional difficulties in the construction of the line were presented by the numerous rivers to be crossed. The Yablonoi Mountains east of Lake Baikal are crossed at the height of about 3,400 feet, the temperature there rising in June and July to 77° F. by day and falling to 23° F. at night.

1013. Since the construction of the Trans-Siberian Railway began there has been a rapid immigration [1] into Siberia from Russia, and a considerable development of trade westwards. In Western Siberia the settlers are allotted free grants of forty acres of land and are exempted from taxes for three years. The railway has naturally attracted to it a great deal of the trade with Russia in Chinese tea and silks, and the railway also carries large quantities of Siberian furs to Europe. Locally there is also a large trade in grain, principally wheat,[2] animals, meat, hides, tallow, wool and dead game, but the principal export trade is in butter.[3] The principal articles carried in the opposite direction are agricultural and mining machinery and other manufactures. Passengers are conveyed in luxurious carriages, and Shanghai, Nagasaki, or Yokohama can be reached by this route in eighteen to twenty days.

1014. The **chief towns** are shown on the map inserted on next page. At the census of 1897 the only two with a population above 50,000 were Tomsk, capital of Western, and Irkutsk, capital of Eastern Siberia. Tomsk is the seat of a university. Kiakhta, on the Siberian frontier opposite the Chinese (Mongolian) town of Maimachin, was formerly the centre of a large caravan trade with China, importing brick-tea and exporting furs and other Siberian products. Before the war Siberian towns were growing with great rapidity, especially those situated at points where navigable rivers are crossed by the Trans-Siberian Railway. At the beginning of the century Novo-

[1] In 1895 the number of immigrants exceeded 100,000, and in several subsequent years it has exceeded 200,000, the great majority remaining in the western governments. In 1908 the number of immigrants exceeded 758,000, a number more than twice as great as the highest number of immigrants into Canada up to that date, but after that date there was a decline (914).

[2] The amount of wheat that reaches European ports from Siberia is small, and that comes chiefly from the section west of Ishim, that is, within about 2,300 miles of the Baltic ports, a distance that may be compared with that of 1,424 miles, the distance from Winnipeg to Montreal; 1,781 miles, Regina to Montreal; and 2,031 miles, Prince Albert to Montreal.

[3] The trade in butter, carried in refrigerator cars, was developed with remarkable rapidity by the opening of the Siberian railway, and this commodity reached Europe before the war from much greater distances than wheat—apparently from as far east as the Minusinsk district or about 3,000 miles from the Baltic. The total quantity of Siberian butter exported in 1898 was about 2,500 tons, while in 1912–13 the amount received thence by the United Kingdom alone was about 27,000 tons. This trade was largely in British and Danish hands.

Irkutsk . . . 130,000

Longmans, Green & Co., London, New York, Bombay, Calcutta & Madras

Nikolaievsk was only a small collection of huts; in 1914 it had a population of 85,000. Tomsk and Yeniseisk doubled their populations between 1902 and 1912. Chita had in 1914 a population of above 70,000.

1015. RUSSIAN CENTRAL ASIA. This name is given to a vast area to the south of Western Siberia extending to the Chinese, Indian, Afghan, and Persian frontiers, either directly under Russian administration or under Russian influence. There still remain the two semi-independent khanates of Khiva (now confined to the west bank of the Amu) and Bokhara, which includes, in the south-east, part of the district of the Pamirs, but since January, 1895, a single customs frontier has stretched from the Caspian to Chinese Turkistan, embracing both these states. This district, which contains the headwaters of the Amu, is sometimes called the Pamir Plateau, but it is, in fact, a series of lofty plateaux, in some places more than 15,000 feet in height, furrowed by valleys in the west, but descending on the east with remarkable abruptness to the plains of Eastern Turkistan. It is a region difficult of access from all sides, and yet one across which there are commercial routes that have often attained a high degree of importance in the commerce between eastern Asia and Europe (**1006**). It has only a scanty population of pastoral tribes. The portion of the Pamirs south of the Oxus and between the Panja headwater of that river and the Hindu Kush, belongs politically to Afghanistan. An eastern strip is Chinese.

1016. For administrative purposes Russian Central Asia is divided into two general governments, that of **the Steppe,** which includes all the northern provinces, suited only to Kirghiz and other nomads, and that of Turkistan, which includes not merely Turkistan proper in the east and south-east but also the Trans-Caspian province. The western part of this latter government consists mainly of plains and low tablelands, mostly desert. Throughout the region, indeed, cultivation keeps for the most part to the neighbourhood of the mountains, and where carried on at a distance from the mountains it is only by the favour of rivers which have gathered volume enough in the mountainous region to reach a considerable distance into the plains. Three rivers reach large salt lakes. These are the Ili, which enters Lake Balkhash through a swampy delta, the Sir, or Jaxartes, and the Amu, or Oxus, which flow into the Sea of Aral. The Zerafshan, the Murghab, and the Heri Rud, on the other hand, all dry up in the sands. Cultivation is carried on where possible along the banks of these rivers and their tributaries, and where the nature of the ground admits of it large tracts are irrigated by means of their waters. The area of the Merv oasis, which uses up the water at the end of the Murghab, is about 1,700 square miles, that is, less than that of the county of Lancaster; but the actually cultivated portion of this is scarcely one-third of the whole, say, about as large an area as that of the county of Worcester.

Tomsk . . . . 125,000.

Besides Merv, the principal oases are Khiva, fed by streams drawn from the Lower Amu ; Bokhara, at the end of the Zerafshan ; Samarkand, higher up on the same river, so that an extension of this oasis involves a diminution of the water-supply for Bokhara ; Tashkent, watered by streams on the right bank of the Sir ; Khojent, and Kokand, on or near the Sir, higher up.

1017. The valleys lying among the eastern mountains, the valley of the Ili, that round Lake Issyk Kul (both in Semiryechensk), and the upper valley of the Sir (Ferghana), are not only plentifully watered, but blessed with a black soil as rich as that of southern Russia ; and in these valleys there was in the pre-war years a remarkable development and the prospect of still further development in the near future. Russian policy contemplated the keeping of this development entirely under Russian control. No foreign capital was to be allowed in the government, and no foreigners were allowed even to visit it without a special permit. Though the Sir and Amu still serve locally as means of carriage for the products of the region, this commercial development may be said to be entirely due to the construction of two railways. The older is the Trans-Caspian Railway, running from Krasnovodsk, on the Caspian, through the Turkoman oases at the base of the mountains in the north-east of Persia, thence by the oases of Tejen, Merv, Charjui (where the railway crosses the Amu by a bridge opened in 1891), and Bokhara, to Samarkand, and thence by Khojent to Kokand, Margilan, and Andizhan in Ferghana. Branches, each about 200 miles long, run south from Merv to Kushk (close to the Afghan frontier), and north from the Sir valley to Taskhent. In early days the working of the long desert track of this railway was greatly hindered by blown sands, but since about 1896 the sands have gradually been brought under control by promoting the growth of sand vegetation, a prominent feature in which is the *saxaul* (*Haloxylon Ammodendron*), a low-growing tree, which yields excellent firewood but grows very slowly. The second of the two railways referred to above is the line from Orenburg running north of the Sea of Aral to Tashkent.[1]

1018. The chief product which these railways serve to transport from central Asia, including northern Persia and Afghanistan, is cotton, which is cultivated throughout the region, but chiefly in the most distant province, that of Ferghana to the north of 40° N., and accordingly further north than the northern limit in the United States (about 37°). The cotton is mainly produced from American seed, which began to be experimented with in 1878, and is of excellent quality. Cotton manufactures have also been started. A mill, originally established on the Tsar's private estates on the Murghab is working with great success. It is for the cotton of Ferghana that the Orenburg connection is of most importance. By the earlier line this cotton from Andizhan, in order to reach Moscow, had first to be carried 1,274 miles

[1] See Woeikof, *Le Turkestan russe*, Paris, 1914, more particularly pp. 52–5.

by rail to the Caspian, then across that sea to Baku, and thence 1,618, in all 2,892 miles by rail, or across to Astrakhan on the Volga, and from there by river boats. The Orenburg route from Moscow to Andizhan is only 2,382 miles in length. So far the extension of cotton cultivation in this part of Turkistan has been mainly due to private initiative, and the cultivators are almost entirely natives. The whole irrigated area in the territories under direct Russian administration, except Semiryechensk is estimated by Woeikof at about 5,700,000 acres, and that in the two Khanates of Khiva and Bokhara at about 3,700,000,[1] in all 9,400,000 acres, or less than 15,000 square miles, while the additional area capable of being irrigated is estimated by him to amount to upwards of 21,000 square miles,[2] a large part of which would be suitable for cotton. Before the war great irrigation projects were contemplated by the Russian government, and attempts were to be made to establish Russian settlers on the new irrigated areas.[3] Ferghana also produces considerable quantities of petroleum.

1019. CAUCASIA. This name may now be given to the territory on both sides of the Caucasus between the Manych depression in the south-east of Russia proper to the north and Armenia and Persia to the south, now composed of the three states of Northern Caucasia (N.C.), lying mainly to the north of the middle parts of the Caucasus Mountains, Georgia (Ge.) to the south of the same parts, and Azerbaijan (Az.) in the east, lying on both sides of the mountains and stretching on the Caspian Sea from Derbent to Astara.[4] The richest part of this region is that which occupies the series of valleys between the chain of the Caucasus and the tablelands to the south. It is not only that part which has the climate most favourable to vegetation (a region, accordingly, of forests, vineyards, cornfields, cotton and tobacco plantations, and pastures), but also that which contains the bulk of the enormous mineral wealth of the Caucasus. Irrigation for cotton and other crops is carried on from the Kur and the Aras to the south-west of Baku. Commercially, the mineral product at present of most importance is petroleum (**549**), but manganese is largely obtained in Kutais (Ge.), near the Black Sea, copper in that of Elizabetpol (Az.); and there are vast supplies of rich iron ore both in the east and west, hitherto almost

[1] See Woeikof, *Le Turkestan russe*, Paris, 1914, p. 232.

[2] *Ibid.* pp. 313, 321.

[3] The population of the present Russian settlement in Russian Turkistan outside of Semiryechensk is under 75,000. *Ibid.* p. 305. In 1900 the quantity of raw cotton introduced into European Russia from this region considerably exceeded 200 million lbs., equal to about two-thirds of Russia's total import. In 1911 the total crop of ginned cotton grown in Russian Turkistan was about 335 millions, or about 100 million lbs. less than the Russian import of raw cotton. By the extension contemplated it is hoped to make Russia independent of foreign supplies.

[4] These three states along with Armenia (**1020**) have agreed to form a political and economic union, making provision for common military defence, the establishment of a tribunal to arbitrate on frontier questions, and the adoption of a common customs frontier.

untouched. A coalfield in Kutais, containing excellent coal, has now been connected by a branch line of railway with the main line which traverses the series of valleys from Baku (Az.), on the Caspian to Poti and Batum on the Black Sea. The chief town in Caucasia is Tiflis (Ge.), on the Kur. It is connected by a road through the gorge of Dariel with Vladikavkaz (N.C.), the terminus of the Russian Railway system on the north of the Caucasus. Baku (Az.), the centre of the petroleum district, is now beginning to rival Tiflis in population and trade. The main line of communication between Baku and the west has been improved by the piercing of a railway tunnel under the Suram Pass (Ge) (on the water-parting between the Kur and the Rion), where the gradient is so steep that traffic was greatly hindered. Batum, by the terms of the treaty of Berlin (1878), was made a free port, and sealed wagons containing goods not intended for Russian consumption were formerly allowed to pass over the Trans-Caucasian Railway duty-free, but these privileges were abolished in 1886. The connection of the admirable port of Novorosiisk (N.C.), at the west end of the Caucasus, with the Russian railway system has made of it a rapidly growing grain port, whose one serious drawback is its exposure to cold northerly winds, which in winter cause the rigging of vessels in the harbour to be covered with frozen spray. (See also **551** and map, pp. 428–9.)

1020. ARMENIA is a new state created since the war, lying to the south of Georgia and Azerbaijan, between the north-west of Persia and the Black Sea. As marked out by the President of the United States of America, its western and southern boundary runs south from a point on the Black Sea in about 38½° E. and then S.E. and E. till it joins the Persian frontier. In the north-east it includes L. Gökcha, a fresh water lake, being drained at least in rainy seasons to the Aras, while L. Van, which has no outlet, is so highly charged with sulphate and carbonate of soda that its water is undrinkable. It is mainly composed of tablelands above 4,000 feet in height, cut off from the port of Trebizond by two parallel mountain ranges, the frequented road across which leading to north-west Persia crosses the inner and higher of the two at a height of upwards of 7,700 feet. The seaward slopes of both these ranges are clothed with forests in which oak, maple, walnut, beech plane, alder, spruce and other trees, mingled with rhododendrons and azaleas grow in luxuriant profusion, but the inner slopes and the plateaux present scenes of stony aridity with only steppe grazing. The rivers, of which the most important are the upper courses of the two headstreams of the Euphrates, mostly flow in deep and narrow gorges, so that the cultivable lands are to be found only in occasional expansions on their banks at such crossing places

Tiflis	225,000	Batum	50,000
Vladikavkaz	80,000	Novorosiisk	75,000
Baku	250,000		

as Erzinjan and Erzerum. The climate is inevitably one of extremes, the coldest month at Kars, for example, at an altitude of 5,700 feet, having an average mean temperature of about 7° F., the hottest $63\frac{1}{2}$°, the corresponding temperatures at Erivan, 3,200 feet, being 16° and 77°. The warm summers thus indicated allow of the growth of such Mediterranean products as can endure severe cold, so that the exports include, besides wheat, barley, wool (some of fine quality), and oak-apples, maize, southern fruits, melons, raisins, and wine. The imports are mainly manufactured articles, and exceed the exports in value, no doubt largely in consequence of the earnings of the transit traffic. The majority of the inhabitants are a Christian people, descended from the ancient Hittites with Aryan intermixture, and people of the same race are found in the adjacent parts of Persia and the south-east of Asia Minor, a region often known as Lesser Armenia.

1021. KURDISTAN as a state is another creation of the war. It is a territory extending southwards from western Armenia to about the parallel of $37\frac{1}{2}$° N., with Diarbekr near the principal headstream of the Tigris as its chief town. Its western boundary is formed by the gorge of the Euphrates. In the north it comprises the elevated tract of the Dersim in the angle between the two Euphrates head-streams, where even the swiftest torrents are frozen for three months in the year. The inhabitants are mainly nomads, who mingle in the adjoining parts of Armenia with the Armenians, with whom they maintain an age-long hostility, due to difference of language and religion and still more to the difference in the mode of life. There are rich copper mines at Argana Maden near the head of the Tigris and silver-lead mines at Keban Maden just below the confluence of the so-called Western and Eastern Euphrates.

1022. ASIA MINOR [1] is a tableland about three thousand feet in height, skirted by valleys and plains, some of which almost vie in fertility and beauty with the huertas of Spain. The heart of the tableland is for the most part arid, at best a rolling steppe, and in great part desert. Even the largest rivers of the peninsula (the Kizil Irmak, Sakaria, Gediz Chai) are too scantily supplied with water to be of much service as means of communication. Though the descent from the tableland to the valleys is in many places abrupt, there are numerous openings through which roads and railways could be constructed, and numerous remains of old Roman roads testify to the more advanced state of civilisation attained here in ancient times.

[1] The political position of Asia Minor is now (July 1921) very uncertain. By the Treaty of Sèvres (August 1920), the whole area to the west of Armenia and Kurdistan was recognised as under the sovereignty of Turkey. Greece, however, received a mandate for the occupation and administration of the town and district of Smyrna, which, nevertheless, were declared to remain under Turkish suzerainty. The vilayet of Konia was placed in a similar position in relation to Italy. These arrangements, however, are contested by a Turkish government having its seat at Angora.

Diarbekr . . .	50,000

The tableland is most closely shut off from the lowlands by the range of Taurus in the south-east, and hence the pass through these mountains known as the Cilician Gates, leading down through a gorge cut by one of the head-streams of the Cydnus to the valley of Tarsus and Adana, is a physical feature worthy of special note.

1023. In the interior trade is still largely carried on by camel caravans, but railways are extending. Of the western railways that diverge from the port of Smyrna the southern, ascending the valley of the ancient *Meander* past Aidin, with the branch ascending that of the ancient *Cayster*, is British; the others are French, but are worked along with all the other railways in the north-west of Asia Minor by the Anatolian Railway Company, which constructed the railway (**636**) starting from the new port of Haidar Pasha, near Skutari, opposite Constantinople, and forks at Eskishehr for Angora and Konia. These lines were built under a government guarantee, which so far has involved an annual payment levied from the Turkish tax-payers. The line to Angora running eastwards as far as the Sakaria down the Porsak valley was completed in 1892, and opens up a district yielding, among other products, grain, opium, meerschaum (at Eskishehr), wool, and mohair. Eskishehr has been made the chief administrative centre of the railway. At the railway workshops established here, 80 per cent. of the mechanics are Turks, who are said to show a natural aptitude for the work. The grain trade of the place has increased very greatly since the construction of the railway, the farmers receiving three or four times the price of pre-railway days, and being so enabled to buy better agricultural implements and thus increase production still further. It is proposed to continue the Angora line eastwards by Sivas to Diarbekr, in Kurdistan, passing through a district rich in silver, lead, and copper. The Konia line was completed in 1896, and since then there has been a considerable immigration from Europe to the district lying south-west of its terminus near the Beishehr or Kirili Lake, whose waters it has been proposed to use for irrigation.[1] Alashehr, on the line that now joins this line at Afiun Karahissar (' Opium Black Castle '), is the ancient *Philadelphia*. The continuation of the Konia line by the route shown on the map of Asiatic railways facing p. 294 is what is known as the Baghdad Railway. In crossing the Taurus it, like so many other railways, does not make use of the old pass route, but runs to the north and east of the Cilician Gates, through several tunnels, and then by another tunnel through the Amanus range in northern Syria. Brusa, the terminus of the short line from Mudania, on the Sea of Marmora, has for centuries been a centre of silk-production and of the working of silk both of local and distant origin. In the south-east of the peninsula a railway from Mersina to Adana, on the Seihun (ancient Sarus), was completed in 1886. This railway opens up a valley of remarkable fertility, noted

[1] See Hogarth, *The Near East*, p. 120.

now, as in ancient times, for its extraordinarily abundant crops of wheat, and proved by trial to be excellently suited for the production of cotton, raw silk, sesame, and other products.

1024. The port of Smyrna possesses a fine natural harbour which remains in the neighbourhood of the town as commodious as ever it was, though the approach to it was in danger of being blocked by the deposits poured in by the Gediz Chai (*Hermus*) on the north. This danger, however, has been removed by diverting the mouth of that river westwards. The nature of the products of the peninsula and its waters is indicated by the chief exports of Smyrna, the first ten in the order of importance being as follows :—raisins, valonia, cotton, opium, figs, barley (of excellent quality), liquorice, carpets, wool, sponges. The absence of oranges may be noted. The rarity of orange-culture in the peninsula is, in fact, one of the indications of the easterly increase of cold in winter, frequently referred to (**52**, &c.). It has already been mentioned that a considerable proportion of the products of Asia Minor and the regions further east reach western Europe by way of Constantinople, being sent thither from the Black Sea ports of Trebizond, Samsun, Sinope, and Eregli, as well as from Skutari and Izmid.

1025. SYRIA includes the whole of the area to the south-east of Asia Minor, south of Kurdistan and west of Mesopotamia, from which the habitable parts are separated by desert. The whole of this area was surrendered by Turkey under the Treaty of Sèvres, and the northern half of it has been entrusted under mandate to the French, the southern, including Palestine, to the British, the division between the two running eastwards from Ras el Abiad to the south of Tyre, then in a loop northwards at the Jordan valley so as to include in the British area the springs of Jordan at Banias, and finally from the south end of the Sea of Galilee east by south to the south of the Hauran. The French area, whose limit on the north-west is formed by the lower course of the Jihun, thus includes Damascus, the capital, Homs, Aleppo, and Aintab, as well as the ports of Tyre, Sidon, Tripoli, Beirut, Latakia, and Alexandretta, while the British includes Jerusalem and Nablus, with the seaports of Jaffa, Haifa, and Acre.

1026. Syria, like Asia Minor, is a province presenting numberless indications of the decline following upon misgovernment. The population is estimated to be less than a tenth of what it once amounted to. The soil, in many places remarkably fertile, is to a large extent impaired by neglect. Terraces for cultivation on the hill-sides have been allowed to fall into ruin.

1027. The climate is characterised by the extremes of temperature characteristic of arid regions. Hail and snow fall on the hills even in

Damascus	250,000	Aintab	75,000
Homs	75,000	Beirut	200,000
Aleppo	250,000		

Palestine, and occasionally there are winters of great severity.[1] The winter rains are abundant to the west of Lebanon (Beirut, thirty-seven inches annually), and further south, adequate to the west of the Jordan, generally about twenty inches, but further east in most parts irrigation is required. In the valley of the Jordan itself permanent settlement ends through lack of rain a short distance to the south of the Sea of Galilee, though the high summer temperatures prevailing there will probably allow of the growth of abundant and valuable products where irrigation can be provided. Further east in the extreme north of French Syria, in the latitudes in which lie the towns of Aintab, Orfa, and Nisibin, the rains are enough to allow of crops of barley, but the vegetation is that of steppes. Through this northern strip runs the Baghdad railway, which crosses the Euphrates close to the site of the old Hittite city of Jerablus.[2] The agricultural products are those characteristic of the Mediterranean generally; but the silk of the Lebanon, the tobacco of Latakia, and the oranges of Jaffa may be specially mentioned. The oranges are derived from a thriving Jewish settlement established in the neighbourhood towards the close of the nineteenth century, where vineyards also are tended and cereals and other crops grow in profusion. To Syria generally, says Sir G. Adam Smith, the apricot is what the fig is to Smyrna and Ephesus. At Salt, east of the Jordan, just south of 32° N., at the height of more than two thousand feet, raisin grapes are largely produced. Soap-making is a locally characteristic industry, inasmuch as the materials are supplied by the olive-tree and soda-yielding plants which grow on the many stretches of saline soil (**601**).

1028. The most populous and flourishing part of Syria is the district between Lebanon and the coast, where Beirut (comp. par. **1033**) is the chief port. A good road has long connected this port with Damascus, crossing the Lebanon at the height of 5,200 feet and passing through Anti-Lebanon in the gorge of the Barada. Since 1895 a railway with a gauge of 3 ft. $5\frac{1}{4}$ ins., built with French capital, has followed the same route, and a line on the same gauge subsequently built now runs from Damascus southwards to the wheat-growing district of Hauran, in which there is still room for extensive settlement. This latter district is now, however, much better served by the railway from Haifa, at the base of Mount Carmel, through the Hauran to Damascus, which has much easier gradients. Acre, to the north of the Bay of Carmel, has some local trade. North of Beirut the chief port is Alexandretta or Iskenderun, the port of Aleppo (**1033**). To Alexandretta, which is to be converted into a great commercial port,

[1] In northern Syria a very severe winter occurred in 1910–11, when the district round Aleppo was buried for forty days under snow and ice, and all traffic was stopped. In February 1920 traffic was stopped for a week round Jerusalem by a fall of snow amounting, it was said, to nearly forty inches.

[2] It was completed before the close of the war as far as Nisibin.

a branch from the Baghdad Railway runs southwards. Jaffa or Joppa is the port of Jerusalem, with which it is connected by rail. The Syrian railway system was linked up with that of Egypt in 1918 in the course of the campaign in which Syria was conquered from the Turks by the British. The majority of the inhabitants of Syria, even in Palestine, are Arabs, and it is through them that the British are endeavouring to administer the country entrusted to them by mandate. But this creates a difficulty in carrying out the pledges made in favour of the Zionist movement, that is, to make Palestine once more a home for the Jews.[1]

1029. CYPRUS, the island in the angle between Syria and Asia Minor, has been under British administration since the treaty of Berlin in 1878, and under the treaty of Sèvres is recognised as a British protectorate. Cultivation is extending, and the export of wine (chiefly for mixing), carob beans, wheat, sesame, and other products is increasing. The vine is principally cultivated round Limasol, on the south coast. Locusts once formed the great plague of the island, but under British direction they have been successfully dealt with. The capital of the island is Levkosia, or Nicosia, in the middle of the great plain, the Mesaoria, which stretches from west to east throughout the island. Important irrigation works have been carried out here. The chief port is Larnaca on the south coast.

1030. MESOPOTAMIA. This region has also been surrendered by the Turks under the treaty of Sèvres, and has been placed by mandate under British control.[2] The seat of government is Baghdad, the importance of whose situation will be apparent from what is said lower down. The territory is almost wholly dependent upon irrigation, and neglect of the works for the purpose—a neglect largely due to the absence of a sufficiently strong government to defend the settled population against the plundering tribes of the desert—has led to an even more striking decline than in Syria and Asia Minor. At various periods of history the banks of the Tigris and Euphrates have been the seats of brilliant civilisations based on agricultural production (**1032**). If only security could be guaranteed, there can be little doubt that the region between the Tigris and the Euphrates might be made once more as prosperous as in the days of the caliphs of Baghdad. In the opinion of Sir William Willcocks, late Director-General of Reservoirs, Egypt, the designer of the Aswan dam, between 4,000 and 5,000 square miles might be reclaimed with great profit between about 34° N. and the site of ancient Babylon in about $32\frac{1}{2}$° N., this area lying mainly west of

[1] Palestine, however, it is contended, is much under-peopled, and it is hoped that provision may be made for as many Jews as are likely to seek admission to the country by the establishment of colonies similar to that above-mentioned near Jaffa.

[2] The present intention is to carry out this mandate by the 'setting up of a distinctly Arab government under an Arab ruler' who will be acceptable to an elected native assembly.

the Tigris north of Baghdad, and stretching from the Tigris to the Euphrates south of Baghdad, but including also about 650 square miles east of the Tigris to the south of Baghdad.[1] In 1909 Sir William was entrusted by the Turkish government with reclamation works on the Euphrates, and on October 27, 1913, a pair of dams constructed under his direction in about $32\frac{3}{4}°$ N., for the purpose of regulating the flow of that river in the Hindie branch, restored the Hilla branch abandoned some fifty years previously. From this latter branch, which passes the ruins of Babylon and the modern town of Hilla, it is expected that it will be possible to feed once more the canals towards the Tigris. A lock in the Hindie dam will allow of navigation above.[2] The land so reclaimed will be available not merely for cereals, pulses, clovers, and such winter crops, but also for cotton, sugar-cane, maize, and the other more valuable summer crops of Egypt. It is hoped that the required security will be through the government provided under British auspices, and the maintenance of that security will at least be facilitated by the railways constructed during the war. Ocean-going steamers ascend to Basra or Bussorah (**1034**) on the Shat-el-Arab, river steamers to Baghdad on the Tigris, an old focus of traffic both for the north and north-west, as well as the north-east (central Persia), on the one hand, and the Persian Gulf on the other hand. The vessels that ascend so far have a maximum capacity of about 500 tons, and take from four or five to six or seven days, according to the state of the river, to ascend from the mouth. Smaller boats reach the still important town of Mosul, opposite the site of the ancient Nineveh, and much produce is brought down even from the neighbourhood of Diarbekr on timber rafts supported by inflated skins, the materials of which are sold at Baghdad. Access to Basra was formerly hindered by a bar at the mouth of the Shat-el-Arab, but this was dredged during the war so as to allow of large vessels reaching the port, which was then provided by the British with a wharf well equipped with handling apparatus. On the Euphrates, navigation is much obstructed by mills and other hindrances. Formerly Birejik, in about latitude 37°, was considered the upper limit; now the river is not considered navigable above Rakka to the south of 36°, and it is not actually navigated beyond Hit, in about $33\frac{1}{2}°$ N.

1031. ARABIA is made up mainly of desert tablelands upwards of 3,000 feet in height. The coast is everywhere bordered by a strip of flat country, generally arid and fiercely hot, and the only parts

[1] Willcocks, *The Restoration of the Ancient Irrigation Works on the Tigris* (Cairo, 1903), pp. 16–18. The total area once irrigated in Babylonia is estimated by Dr. Wagner at 7,700 to 9,650 square miles. (See *Petermanns Mitteil.*, 1902, 'Litteraturbericht,' p. 198.)

[2] See *Geographical Journal*, vol. xliii., pp. 415–19, with maps (April 1914), and vol. xxxv., p. 1, with map (January 1910).

Basra . . .	160,000	Baghdad . . .	250,000

that have even a fair supply of rain are the mountainous tracts in the south-west (Yemen) and the south-east (Oman). Yemen, the Arabia Felix of the ancients, has mountains rising to upwards of 10,000 feet in height, and has an ideal climate for coffee-culture (**100, 402**). Cultivation, however, is declining either through desiccation or the washing away of the soil. The oases in the interior are the home of the Arab race in its purity, the typical region of the fleet desert horse, the camel, and the date-palm. Politically, Arabia is divided. The peninsula of Sinai belongs to Egypt; the remainder of the west coast includes the kingdom of the Hejaz in the middle and the imâmate of Yemen further south. The interior oases of Nejd, capital Riyadh, are subject to an Emir, who now extends his sway over the coast-strip of El Haza, on the Persian Gulf, extending to the bay situated to the south of the Bahrein Islands. The remainder of the east coast forms the sultanate of Oman. Aden, on the south coast, about 120 miles from the Strait of Babelmandeb, has belonged to the British since 1839,[1] and is annexed to the Presidency of Bombay (British India). Possessing an admirable natural harbour, it has at different periods been a great *entrepôt* in the trade between Asia, Africa, and Europe, and since the opening of the Suez Canal its importance in this respect has greatly increased. The site it occupies is nevertheless so sterile that all provisions and firewood have to be imported, and water is largely derived from the condensation of steam from sea-water. In Yemen the most important town is Sanā, which lies at the height of about 7,500 feet in the interior; and the port of Hodeida, in direct communication with this town, is the busiest seaport on the Red Sea. The port of Mokha, further south, gives name to the coffee of Yemen. In the Hejaz the chief town is Mecca, to which, as well as to its port, Jidda, the Mohammedan pilgrimages (**213**) give a great deal of mercantile importance. It was to facilitate those pilgrimages that the railway which now connects with the Baghdad Railway at Muslamiye to the north of Aleppo was constructed. The Sultan of Oman—or, as he is known from his capital, the Sultan of Maskat (Muscat)—is pledged by a treaty with the British, concluded in 1892, not to cede any part of his territory without British consent. Since the early part of the nineteenth century both sides of the Persian Gulf have been policed by the British fleet, and a British company has laid the only buoys which mark practicable channels and safe anchorages.

The small territory round the inlet of Koweit, or Koait, which forms an excellent natural harbour, is subject to an Arab sheikh under British protection. This harbour, also known as Grane or Korein, has frequently attracted attention as the proposed terminus of several

[1] Attempts on Aden were made by the Portuguese in the early days of their eastern trade, first in 1506, but they were not successful.

Mecca . . .	100,000

projected railways from the Mediterranean to the Persian Gulf, previous to the Baghdad Railway, of which it will probably be the ultimate terminus.

1032. The whole of the area embraced by paragraphs **1022-31** is of extreme interest in the history of commerce (**1006**). There are three areas in the Tigris and Euphrates valleys where the natural conditions, when properly utilised, have favoured the concentration of population. One is on the right bank of the Tigris, north of 36° N., where the waters brought down from the mountains of Kurdistan were in ancient times spread out so as to irrigate the core of the ancient empire of Assyria round the extensive city of *Nineveh*. Since the fall of Assyria there has been only a feeble irrigation system in and round Mosul, on the opposite bank of the river. Lower down, where the rivers Euphrates and Tigris approach one another, the slope of the ground is such as to lead canals running eastwards and slightly southwards from about $33\frac{3}{4}$° N. on the Euphrates to about $32\frac{1}{4}$° N. on the Tigris, and then, still lower, the slope becomes more southerly, so as to lead the water back towards the Euphrates. At a very remote date the whole of this narrow tract between the two rivers appears to have been irrigated by a network of canals converging at *Babylon* on the Euphrates, and making that city the capital of one of the most renowned empires of antiquity. The final decay of this city appears to have been largely due to the withdrawal of a great part of the water-supply of the neighbourhood in order to support the cities that grew up at the ends of the great canals running from the Euphrates to the Tigris north of 33°. In that district, about the meeting-place of these canals, there have again and again been important and wealthy cities, which derived further advantage from the fact that the Diala formed a waterway leading up to one of the chief entrances into western Persia (**1036**). In ancient times *Seleucia*, some little distance below the modern Baghdad, on the right bank of the Tigris, was, from about 300 B.C., the capital of the Greek kingdom of Syria, and afterwards, till its destruction by Severus in 198 A.D., an important city of the Roman province of Syria. After this event its Parthian rival *Ctesiphon*, on the opposite bank of the Tigris, flourished, first under Parthian and then under Persian rule, till it was destroyed by the Arabs in 635 A.D. More than a hundred years now passed without an important city in this district, but at last, in 762, Baghdad was founded a little to the north of the ruined cities of Seleucia and Ctesiphon, and by the time of the celebrated Caliph Harun-al-Rashid, so well known from the 'Arabian Nights'—that is, in the early part of the ninth century—the whole district round had been revivified by the restoration of the irrigation works, and Baghdad remained for centuries one of the most magnificent cities of the east in the heart of one of its most productive agricultural regions.[1] The main irrigation canal on the

[1] See the translation of a description of Mesopotamia and Baghdad written

east side of the Tigris, nearly 400 feet wide, was one with which no Egyptian or Indian canal of the present day can compare in magnitude.[1] A careful examination of the plans and levels of this district has led Sir William Willcocks to the conclusion that the ruin of this magnificent irrigation system must have been due to a sudden change in the course of the Tigris, which then seems to have eaten away a portion of this canal, the water in which has now a width of only from 16 to 30 feet.[2] Even after the destruction of this eastern canal there still remained a great canal running from the Euphrates to the Tigris at Baghdad, and serving for navigation as well as irrigation. As late as the latter part of the sixteenth century this was the regular waterway from the upper Euphrates to the Persian Gulf. It was by this route that at that time (1583) the first English commercial expedition, that of John Newberie and his companions, Ralph Fitch, William Leedes, and James Story, proceeded to India.

1033. At all periods when there has been an important civilisation in any part of the plains bordering the Tigris and Euphrates there have been important trade-routes passing thence to the northern part of the Syrian seaboard. It was this seaboard which at a very remote period of antiquity was occupied by the Phœnicians, a people who, according to their own traditions, confirmed by the evidence of remains of various kinds, originally came from some district bordering on the Persian Gulf. Numerous remains on the Bahrein Islands [3] show that, if that was not their original home, they must at one time have been settled there. The names of two of the Bahrein islands, *Tyrus* and *Aradus*, were repeated on the Phœnician coast. If they came from the Persian Gulf they no doubt retained the tradition of the way thither. In any case the wealthy empires on the Tigris and Euphrates formed the most valuable part of the hinderland of that seaboard. From Nineveh the trade-route would pass by way of the modern Aleppo and descend on one of the northern ports such as Aradus (now Ruad) or Tripoli. From Babylon the route necessarily first ascended the valley of the Euphrates. The untraversable desert on the west inevitably barred direct connection with the sea. But having reached a point on the Euphrates somewhat north of 35°, traders could make use of a long furrow with water holes leading south-westward to Damascus.[4] Now it is to be noted that Damascus can be conveniently reached from Sidon and still more conveniently from Tyre without crossing either Lebanon or Anti-Lebanon, and there can be no doubt that special

about 900 A.D., with annotations by Guy Le Strange, in the *Jour. Roy. Asiat. Soc.*, 1895, with map (p. 33).

[1] Sir Wm. Willcocks, *The Restoration of the Ancient Irrigation Works of the Tigris* (Cairo, 1903), p. 12.

[2] *Ibid.* p. 14.

[3] See a paper by the late Mr. Bent in *Proc. R.G.S.*, 1890, p. 1.

[4] On this route the longest stretch on which Baron v. Oppenheim in 1893 found no water was sixty miles. See *Petermanns Mitteil.*, 1896, p. 57 (comparing map).

importance was conferred on these two ports, at both of which local conditions favoured the construction of harbours suited to the small ships of the time, by their relation to that ever-flourishing oasis. That oasis must have been the cause of bringing a large proportion of the commerce between the Mediterranean and the Euphrates valley by the route above referred to, and hence of giving a special stimulus to the textile, metal, glass, and other industries to which commerce gave rise on the Phœnician seaboard.[1] For thousands of years the towns on the Phœnician seaboard had the advantage of lying between the highly-developed civilisations of Mesopotamia, on the one hand, and the Mediterranean on the other hand, the Mediterranean including the equally ancient and brilliant civilisation of Egypt together with a multitude of coasts and maritime valleys supplying in abundance food and raw materials. Tyre was destroyed in 332 B.C. by Alexander the Great, and the whole Phœnician seaboard then fell under Greek rule. But that did not put an end to the importance of this coast. Tyre flourished again in Roman times, though Beirut (*Berytus*), which is the port of the most extensive strip of fertile coast in Phœnicia, had already become an important rival. Once more it flourished in the middle ages, especially during the period (twelfth and thirteenth centuries) when the crusades gave Venetian and other Christian merchants greater security on this seaboard. At this time, however, Aleppo in the north had as powerful an influence on trade-routes to the Euphrates as Damascus in the south, and hence the northern ports were also much frequented. Latakia was the favourite port for that centre till its commodious harbour was destroyed by an earthquake in 1183. Its place was then taken by Alexandretta, but even Tripoli, far to the south as it lies, was also frequently made use of by merchants on their way to Aleppo. Even the discovery of the sea-way to India did not altogether put an end to the distant trade that passed through this seaboard. The Portuguese, who discovered that route (**157**), took from the Arabs the island of Ormuz at the mouth of the Persian Gulf (1515), and, retaining it for upwards of a hundred years, still preserved a great deal of the trade that it had long possessed, in virtue of its situation at a point whence a great trade-route passed northwards into Persia and north-westwards to Mesopotamia and the Mediterranean. The great trade of the place is described by Ralph Fitch, the chronicler of the first English expedition to India in 1583. The island lost its importance when it was taken by the Persians, aided by the English, in 1622, but the memory of its former glory lived long enough for it to be taken by Milton as a symbol of oriental wealth and splendour.

1034. It can hardly be considered surprising that the Arabs, the

[1] On the geographical foundations of Phœnician commerce and industry see Élisée Reclus, *La Phénicie et les Phéniciens*, in *Bull. de la Soc. Neuchâteloise de Géog.*, vol. xii. (1900).

people occupying the vast peninsula between the two avenues leading from the Mediterranean to the east, should have been great traders from the earliest times down to the present day. The valley of Hadramut in the south of Arabia was the principal source of frankincense, one of the oldest and most valuable articles of commerce. Arab ships at an early date brought spices from India and gold from South Africa. The Zimbabye ruins in the east of the Transvaal have been proved to be of Arab origin, and it is most likely that they date from before the beginning of the Christian era. They had equal experience in caravan traffic by land, a natural result of the character of their country. Another result of this latter circumstance was their knowledge of the value of running water and the skill in irrigation which they developed at an early date. At Marib, in Yemen, some eighty miles north-east of Sanā, there are remains of a huge irrigation dam two miles long and about 120 feet high, believed to have been originally built about 1700 B.C. When, after the death of Mohammed in 632 A.D., the Arabs, acting under a strong religious impulse, spread east and west from the centre of their faith, their skill in irrigation and commerce greatly assisted them in founding the brilliant Arab civilisations that grew up at various centres. It should be noted that the area which their conquests ultimately embraced, extending from the Spanish peninsula through north Africa to the valley of the Indus, was almost confined to countries in which irrigation was a matter of the first importance. In Spain they maintained themselves longest in the region in which irrigation was most valuable. In north Africa at Kairwan they established a brilliant capital on a site where none but Arabs would have thought of doing so. In Egypt and in Syria they acquired the succession to the irrigation systems of the Nile valley and Damascus. In Mesopotamia, we have already seen, they renewed the old irrigation works about the confluence of the Tigris and Diala. On old caravan-routes between the Indus valley and Mesopotamia there are numerous remains of undoubted irrigation works of Arab origin. In the west commerce was carried on by them for the most part chiefly by land-routes. In the earlier centuries of their expansion they did indeed make important conquests (Sicily, Crete) in the Mediterranean, but there Christian powers in the end outstript them at sea, and an Arab historian tells us that the rise of Tunis, situated at the head of an easily defended inlet, at the expense of Carthage in the early part of the eighth century was largely due to the fear of attacks from Europe to which Carthage in its more exposed situation was open.[1] In the Indian Ocean, however, Arab sailors were very adventurous. Immediately after their conquest of Syria and Persia, in 635 or 636 A.D., they founded on the Shat-el-Arab the port of Basra, which then became the intermediary between Mesopo-

[1] Dr. Brown's edition of *The History and Description of Africa*, by Leo Africanus, iii., p. 716.

tamia and the east, and grew in importance after Baghdad had arisen and begun to flourish on the Tigris. In the centuries immediately preceding the Arab conquests, Chinese ships had frequented the Persian Gulf and even ascended the Euphrates. From the Chinese the Arabs learnt the use of the mariner's compass, and with its aid made bold voyages right across the Indian Ocean and the China Seas.[1] They ultimately had regular trade relations for a time even with Khanpu on the Gulf of Hangchow, and a report from an Arab traveller of as early a date as 851 has come down to us showing a wonderful amount of knowledge even of the remote interior of China.

1035. PERSIA,[2] like Arabia, is largely made up of tablelands more than 3,500 feet in height, and in the east these are in a large measure desert. In the west a large part is above 5,000 feet. In the east, on the other hand, it sinks in the district of Sistán or Seistan, in which the Helmand ends, to an altitude below 2,000 feet. Mountains in the west and north promote a large precipitation, which, as it takes place mainly in winter, is largely in the form of snow. The water thus becomes available in spring, on which account, according to the estimate of St. John, the desert area of Persia is reduced from nine-tenths to one-half. In any case the precipitation, even where insufficient by itself for cultivation, as it mostly is, at least feeds numerous streams that can be used for irrigation, or supplies moisture which can be drawn from the heart of the mountains by tunnelled canals (kanats or karizes). The temperatures are high enough to allow of the cultivation of wheat up to 9,000 feet, of the grape-vine up to 7,500 feet, and rice up to 4,000 feet. There are numerous date-palms round Bam at the height of about 3,500. Rice is naturally grown to a large extent in the swampy plains, partly below sea-level, bordering the Caspian, and here silkworms, which yielded a valuable product in the middle ages and even later, are still reared. Sistán, the eastern half of which belongs to Afghanistan, is imperfectly irrigated by water drawn from the Helmand. Formerly this district was much more productive, but it has lain waste to a large extent since Timur (Tamerlane) in the latter part of the fourteenth century destroyed a great irrigation dam across that river. There can be little doubt, however, that its productiveness might be restored by strong and honest government.[3] Through the misgovernment of despotic rulers, however, production and commerce in Persia generally are in a very backward condition.

[1] See the map accompanying a paper by Col. Yule in *Proc. R.G.S.*, 1882, p. 651.

[2] An agreement between the United Kingdom and Russia dividing Persia into zones of influence (1907) was cancelled by the war, and a new agreement concluded with Persia in 1919 made British influence predominant in that country, but 'not to the prejudice of Persian sovereignty.'

[3] Two great irrigation schemes are now under discussion, one for storing the flood waters of the Zayende Rud by a barrage so as to provide the means of irrigating the plain of Isfahan, by which means it is estimated that enough grain could be grown even in years of extreme drought to supply the whole Persian tableland; the other to irrigate large tracts of Arabistan from the waters of the Karun.

1036. The means of communication are very imperfect, but have been improved in certain places within the last few years. From whatever direction the interior is reached from the sea a difficult ascent has to be made through the mountains bordering the Iranian tableland, and the only approach on which that access is facilitated by rail is that from the Indus plains to Quetta (**1040**), which is separated from Persia by hundreds of miles of arid steppes. The road inwards from Bushire is an extremely difficult mule-caravan road, and seems likely to be to a large extent abandoned in favour of the route described in the next paragraph. Even from Tehran, the capital, to Tabriz, the chief city in the north-west, goods have still to be carried the greater part of the way on pack animals, though this latter city is now reached from the north-west by rail. A carriage-road has since 1879 led north-westwards as far as Kazvin, and since 1899 a good carriage-road constructed by a Russian company has led thence down to Resht on the Caspian littoral behind the port of Enzeli. Since 1892 another carriage-road has led from Meshed, the chief town in the north-east (Khurasan), a great resort of pilgrims, to the Persian frontier, where it joins the road from the Trans-Caspian town of Ashkabad. Another road leads south from Tehran to Kum, but with these exceptions Persian roads are not capable of being continuously used by wheeled vehicles, although this is possible during dry weather in the plains. From Baghdad the traffic still ascends to Kermanshah and Hamadan through the Holwan (or, as it was called in ancient times, the *Zagros*) defile with the same difficulty as had to be encountered in ascending from the cities of the Mesopotamian plain in ancient times. An equally difficult route leads from Bandar Abbas, opposite the formerly celebrated island of Ormuz (**1033**), to Kerman.[1]

1037. The only navigable river in Persia is the Karun, which belongs to the Mesopotamian plains, its mouth being connected by a side-arm with the Shat-el-Arab. Its navigation as high as Ahwaz or Ahvaz, where rapids occur, was thrown open to foreign vessels in 1888. At that time the construction of a carriage-road leading by Shushter, Dizful, and Sultanabad, and ultimately joining the Kum road from Tehran, was contemplated, but it has not been carried out. A mule-caravan road has, however, been made from Ahwaz through the Bakhtiari country to Isfahan, and though it repeatedly goes up and down as much as 2,000 feet and ultimately rises to an altitude of 7,800 feet, it is nevertheless easier than that from Bushire and only about

[1] Improvement of the communications is still slow, but in 1913 arrangements were made for the construction of a railway from Julfa (adjoining Isfahan) to Tabriz, and this railway was opened in May, 1916. In 1913 also a British company received a concession for a line from Mohammera by Shuster and Dizful to Khurramabad, ultimately to be continued to Isfahan.

Tehran	200,000	Kermanshah	75,000
Tabriz	200,000	Isfahan	75,000
Meshed	75,000		

half the length (277 miles as against 530). This route is therefore likely more and more to attract the trade from Bushire, especially since Mohammera, the seaport on this route, situated on the arm connecting the Karun with the Shat-el-Arab, is a commodious port at which vessels of large draught can approach close to the bank, while Bushire has only an open roadstead.

1038. By such routes few articles except such as are of relatively high value in proportion to their bulk can be conveyed. The chief exports are pearls (derived of course from the Gulf), opium, raw silk (**1035**), carpets, petroleum (**554**), gums (including gum tragacanth), various drugs and dyes, coral (chiefly from Khurasan), turquoises (from Nishapur), horses, for which Persia has been famous for centuries, &c. The principal imports are cottons, sugar, tea, pearls, wheat, and flour. Of late years Russian trade has been growing in northern Persia (the most populous part of the country) at the expense of the British. This has been due to various causes, of which the chief are the shorter distance from the Caspian ports and from Ashkabad to the interior.

1039. AFGHANISTAN resembles Persia in surface, climate, and products, and is, like it, cultivated where irrigation can be practised, in the vicinity of the mountains; barren or nearly barren elsewhere. The richest valleys are in the north—those of the Kabul River and the Heri Rud. On the former river stands Kabul, the capital, which has been connected with Peshāwar by a carriage-road through the Khaibar Pass since the temporary occupation of the town by the British in 1879. On the Heri Rud stands Herat, the centre of a well-irrigated and fertile valley, about 120 miles in length by about twelve miles in width. Besides the road above-mentioned there are no roads for wheeled carriages, and goods are carried on beasts of burden, chiefly camels, through close and craggy defiles and narrow stony valleys, among bare mountains, or over waste plains. Formerly traders on this route had constantly to defend themselves against robbers, but in the vicinity of the British frontier more peaceful and secure methods of carrying on trade have been established. A British escort accompanies the traders through the mountains to the Afghan frontier, and there hands over the caravan to an escort of Afghans. The trade with India, however, is very limited in consequence of the restrictions imposed by the amir. At one time there was a considerable trade through Afghanistan between India and central Asia. It passed to a large extent across the Bamian Pass (12,000 feet), between the Hindu Kush Range and the Koh-i-baba west of Kabul, a route which at various dates in the middle ages was much used for valuable commodities. But such through trade has been entirely stopped, partly by the heavy transit duties imposed by the amir, and partly by the customs duties levied on the Russian frontier. The small trade that India still carries on with Afghanistan consists chiefly in the import of wool and dried fruits in exchange for cottons, tea, and sugar.

1040. BALUCHISTAN is composed mainly of arid and unproductive tablelands inhabited by scattered tribes. Its government is now under British control, and a tract in the north-east composed of the districts of Pishin and Sibi, and containing the fortress of Quetta (5,500 feet), forms part of British India. This place is now connected with Sind by a railway with one loop running eastwards up the Nari pass, and another (with gradients of 1 in 24) up the Bolan pass. The idea of opening a trade-route from Quetta through northern Baluchistan with Sistán and Meshed in Khurasan, a distance of more than 1,000 miles, has long been entertained. A caravan-route was at last established about 1898, but the trade by that route, though it grew rapidly, remained insignificant.[1]

[1] A railway now runs westwards from Quetta through Nushki to Robat on the Persian frontier, and this will no doubt lead to a considerable increase.

Towns in Afghanistan.

Kabul	180,000	Kandahar	80,000

THE MONSOON COUNTRIES AND THEIR DEPENDENCIES

INDIA

1041. There is no part of the world better marked off by nature as a region by itself than India, exclusive of Burma. It is a region, indeed, full of contrast in physical features and in climate, and one that has never been, strictly speaking, under one rule; but the features that divide it as a whole from surrounding regions are too clear to be overlooked. On the north it is bounded by the Himalayas, the loftiest mountains in the world; on the west, as we have already seen, it is bounded by mountains and deserts; and on the east and north-east it is not only bounded by mountains, but lofty mountain chains and deep valleys follow one another for hundreds of miles. Elsewhere the boundary is the sea.

1042. Within the mountains a vast plain, from about 150 to more than 300 miles in width, sweeps round from the delta of the Ganges and Brahmaputra in the east to that of the Indus in the west. The peninsular portion to the south of these plains is mainly made up of tablelands varying in elevation for the most part from about 1,500 to 2,500 feet. On the west this tableland advances close up to the sea, and is bounded by the mountains called the Western Ghāts; but on the east its boundary is generally at a greater distance from the coast and is more winding. The name of Eastern Ghāts is sometimes used generally for the whole of this boundary, sometimes restricted to its southern portion.

The dense population is for the most part confined to the plains, but is prevented by climatic and other circumstances from extending over their whole area.

1043. In the plains communication is naturally easy. The scarcity of stone in the great plains of the north has been an obstacle to the making of good metalled roads, but the rivers of the Ganges basin mostly furnish good waterways, and the flatness of the surface has greatly facilitated the construction of railways. On the other hand one must bear in mind that this flatness creates difficulties in protecting the land adjoining the railway embankments in the rainy seasons, that the number of the rivers to be crossed necessitates great expense in bridging, and that in the moist regions the vigour of the vegetation, and in the dry, dust storms, add to the expense of main-

tenance. Though the map on p. 510[1] is on too small a scale to be complete, it shows the main features of the Indian railway system, and enables one to understand the fact that in the middle of the Ganges basin they have almost superseded water carriage, except in the case of heavy goods. In the delta of the Ganges and Brahmaputra, which furnishes an unsurpassed system of water communications, the network of railways is not so close, and the Brahmaputra still forms the main highway to the north-east. A line of steamers regularly plies up and down it as far as Dibrugarh, about fifty miles below the angle made by this river on entering Assam. The Indus, owing to frequent shiftings of its bed and accumulations of sand, is not so easy to navigate, and steamer traffic on it has now been abandoned.

1044. One disadvantage of the difference of gauge shown on the railway map, the resulting prevention of intercommunication between lines on different gauges without break of bulk (**1374** *n.*), is obvious. But it will be observed that this drawback is at least mitigated in India by the fact that there are interconnected lines on the standard gauge from Peshāwar in the north to Calicut in the south, and that there are extensive interconnected systems on the metre gauge, both in the north and the south. But it is also to be noted that narrow gauge railways are necessarily less efficient than those on a broad gauge, and that, it would seem, not only because of the smaller capacity of the wagons, but also because the speed on them is less. According to Sir Charles Metcalfe the speed attainable on a $3\frac{1}{2}$ ft. gauge is only half that on a 4 ft. $8\frac{1}{2}$ in. gauge.[2] On the other hand, narrow gauge railways are much cheaper to construct, especially in hilly country, and it is as uneconomic to make expensive railways in regions which are never likely to yield traffic enough to utilise their full efficiency, as it was to construct the *Great Eastern* steamship before the traffic of the world required it.

1045. In the peninsular portion of India the nature of the surface has placed special difficulties in the way of communication between the coast and some of the richer plains or depressions of the tableland in the interior. The rivers in times of flood are too impetuous, at other seasons most of them are too scantily supplied with water to be navigable except near their mouths, and even where they are navigable higher up, their navigation is impeded by rapids occurring where they break through the mountains bordering the plateau. Not only so, but they mostly break through these mountains in gorges too narrow or country too wild to be easily traversed by roads or railways. On looking at a physical map of India one might expect the valley of the

[1] The standard gauge railway in the north-west of India which was carried on to Jamrud at the entrance to the Khaibar Pass about the beginning of the present century is now (1921) being continued through the pass to the Afghan frontier. There are also a number of mountain railways on narrower gauges (2 feet and less) than those distinguished on the map.

[2] *Geog. Journ.*, vol. xlvii., p. 6.

Narbadā, continued by that of the Son, a tributary of the Ganges, to form a natural line of communication between the Gulf of Cambay and the valley of the Ganges; but this is prevented by the existence of rugged forest country on the lower part of the Narbadā, and a region so wild in the upper two-thirds of the valley of the Son that it is still imperfectly explored. Hence the railway that now passes through the most fertile expanse of the valley of the Narbadā, between the Vindhya Hills on the north and the Sātpura Hills on the south, enters this valley by a diagonal route from Bombay, and leaves it near the head of the valley of the Son, then striking north-eastward to Allahabad. So, too, a series of fertile depressions [1] of the tableland is cut off from the coast by wild and difficult country on the lower part of the Tāpti, and this region is hence reached by a branch of the same railway that proceeds from Bombay to the valley of the Narbadā. To gain the surface of the tableland, this railway has to cross a pass called the Thāl Ghāt, more than 1,900 feet in height; and communication between Bombay and Madras, across the Deccan, as the southern part of the tableland is called, is now (since 1863) effected by means of a railway up the Bhor Ghāt, a pass about a hundred feet higher than the former, and much more difficult. The carriage-road up this pass, completed in 1830, itself a remarkable engineering achievement, formed the first good means of communication between Bombay and the interior.

1046. A third railway now crosses the Western Ghāts about the middle, serving to connect the Portuguese port of Goa with the fertile district of Dhārwār, and through that with Madras; but south of this there is no other railway across the peninsula till we come to the remarkable depression known as the Pālghāt Gap. This important physical feature lies immediately to the south of the Nīlgiri Hills, a group of small but high plateaux in the south of the Deccan at the angle where the Western and Eastern Ghāts approach nearest to one another. The highest elevation of the gap is a little more than 1,000 feet above the sea, and the opening which it forms is all the more striking from the fact that it separates mountains rising to nearly 9,000 feet in height both on the north and south. The southern mountains extend to the southern extremity of the peninsula, occupying the greater part of the native states of Cochin and Travancore. Through the gap between them and the Deccan runs the railway from Madras to Calicut.

1047. As regards **climate,** the Indian year is divided into three seasons—the hot, the rainy, and the cool; but these names are appropriate only in the north-east and to some extent along the western coast. In the south, where the latitudes are low, there is no really

[1] One of these depressions in the upper basin of the Mahānadī was opened up by rail only in the early part of 1916, with the result that land which had brought a rent of 4*d.* an acre yielded excellent crops of cotton, ground-nuts, and sugar cane, and a rent of 13*s.* an acre. *Times Trade Supplement,* No. 77, p. 386.

cool season, and in the north-west, though the rains occur at the same period as in the Ganges valley, they are small in amount. The hot season is from March to May inclusive, the period that embraces the change of the monsoons from north-east to south-west, but before the 'bursting' of the south-west monsoon—that is, before the southerly winds begin to be accompanied by rain. During this period the highest temperature is in the heart of the Deccan. The rainy season lasts from June to October inclusive, and during this period the western slopes of the Western Ghāts, the hills of Assam, and in the east of the Himalayas, and even the plains of the Ganges delta, are deluged with rain, and the greater part of the north-east receives a fairly abundant rainfall. The part of the Deccan immediately behind the Western Ghāts, however, has a very moderate and precarious rainfall, and so too have the plains in the north-west. A large part of the Indus valley is almost rainless. Where the rains are abundant the temperature is mitigated, but in the arid region just referred to this is naturally the hottest period of the year. The cool season, or the season of the north-east monsoon, lasts from November to February inclusive. This is the rainy season for the south-eastern plains, the moisture carried by the winds blowing across the Bay of Bengal being condensed in consequence of the obstruction presented by the Eastern Ghāts and the mountains of Travancore. But the amount of rain that falls on those plains is only one-third or one-fourth of that which falls on the best-watered plains in the north during the rainy season. This season is naturally coolest in the north-west, where the highest latitudes are reached, and even on the plains there are genuine winter temperatures by comparison with the extreme heat of summer. In this region, in the latter half of the cool season (January to about March) there is a recurrence of rains.

1048. The amount of rain that falls varies in India, as everywhere else, from year to year; but it is an important fact that, whereas in a country like England the variations in the rainfall may increase or diminish the abundance of a crop, in a large part of India the variation may be such that in one year there is an ample supply for a good crop, in another a rainfall wholly inadequate to produce any crop at all. It is this area of uncertain rainfall that is liable to be visited by famines, and hence **irrigation** has to be practised not only in those parts of the country in which there is always a deficiency of rain, but also in those in which it is doubtful whether the rain may be sufficient or not. Even where the amount of the rain is sufficient for the requirements of the crops irrigation is in many cases demanded by the mode in which the rain falls. The north-east monsoon, on which the southern plains (Madras) chiefly depend for rain, is remarkable for the fact that rain falls for the most part in bursts, and generally at night. 'I have known,' says Sir Arthur Cotton, 'a fall of ten inches in one night, and a fortnight after twelve in another'—half a year's supply in two

showers. Accordingly Madras and the Deccan generally are dotted with thousands of tanks or reservoirs for irrigation-water, except in those portions, chiefly lying in the north-west of the Deccan, which are covered with the black soil described in par. **362.**

1049. These tanks usually contain little, if any, more than one year's supply, and hence are altogether inadequate to meet the uncertainties arising from recurring years of drought. In certain places, however, there is a natural storage of water underground that can always be made available by means of moderately deep wells. The whole of the plain along the base of the Himalayas has constant supplies of fresh water at a greater or less depth, and the middle portion of it has these supplies near enough to the surface to be easily reached. 'Hence, between Delhi and Benares, the upper stratum of the alluvial plain is riddled like a sieve with water-holes or wells ten to fifty feet in depth.'[1] A successful artesian boring has been made at Patiāla, a native state of the Punjab plains.

1050. The greatest irrigation works are canals led from rivers. In the Indus valley some canals for irrigation are merely laid so as to carry off the surplus water, when the melting of Himalayan snows causes a rise of the water in the main stream and its tributaries. These are known as inundation canals and have been long in operation, and, though very useful and profitable in most years, the supply of water by this method is precarious, as the rise of the rivers may be so small as to yield little water or none at all. But works of much greater magnitude have been made in the form of canals, into which is led nearly the whole body of water belonging to a river for a greater or less distance. These are known as perennial canals. On the delta of the Cauvery such canals are said to have been constructed as far back as the fourth century of the Christian era, but under British rule such works have been extended to all the other deltas of the east coast and parts of the plains of northern India.[2] There are no irriga-

[1] *Statistical Atlas of India.*

[2] About 1885 the total length of canals under government supervision was above 28,000 miles, and the area irrigated by them was equal to that of Belgium (11,400 square miles). In 1919–20 the area irrigated had been increased to about 28,000 square miles (about 1,000 square miles less than the area of Scotland). The most important irrigation work opened since the first edition of this work is the Chenab (now the Lower Chenab) Canal in the Punjab, which was in use for the first time in 1892–93, when it irrigated an area of 157,197 acres. In 1915–16 the area irrigated exceeded 2,280,000 acres (more than the combined area of Lincolnshire and Notts), and the return on the capital outlay was in that year 40 per cent., the return having steadily increased. Meantime colonies of settlers had been established on what had previously been unpeopled crown wastes. In April 1914 the Upper Swat Canal, which involved the piercing of a canal through the Malakand Hills to establish a colony of nearly 600 square miles in extent in the northern part of the Peshāwar district, was opened. At present (1921) a project is under consideration for the construction of a dam across the Indus at Sukkur, which would make it possible to place some $5\frac{1}{3}$ million acres (8,640 square miles) under perennial irrigation, and would be of special importance for cotton cultivation. It is estimated that the execution of this scheme would render about 400,000 acres

tion canals on the lower Ganges, where they are not required (**1047**); none on the area between the Ganges and the Gogra, for the reason stated in the previous paragraph; and few on the upper parts of the rivers of the Deccan, where the depth of the river valleys below the surrounding country (**1045**) does not generally admit of this mode of irrigation. These canals serve also for navigation. Here also may be mentioned the Buckingham Canal, which, being a salt-water canal, is not available for irrigation, but forms an inland waterway from the mouth of the Godāvari to Madras, and about fifty miles further south.

1051. In connection with irrigation it may be pointed out that the structure of the country, combined with the character of the climate, affords in many places, as in the Himalayas and the Western Ghāts, the opportunity of forming immense tanks or reservoirs by damming the mouths of narrow valleys, providing at once the means for irrigation and the development of water power. In one case the headwaters of the Periyar in the native state of Travancore have been dammed and the lake thus formed drained through a tunnel to the east side of the Cardamom Hills, so as to irrigate arid plains in Madras.[1]

1052. As might be inferred from the table of exports, India is almost exclusively an agricultural country. At the census of 1881 the number of persons directly supported by **agriculture** and the rearing of live-stock made up 72[2] per cent. of the male inhabitants engaged in some specified occupation. The holdings are mostly small, on an average about five acres each. In Bengal, the Famine Commissioners in 1880 reported that two-thirds of the peasant holdings were only about half that size. The land furnishes the chief source of the revenue of British India. The land-tax is the first liability on the land. In some provinces it is generally paid by the actual cultivators (the rāyats), who are small proprietors; in other cases, by larger landowners from whom the cultivators rent their holdings.

1053. For the most part two crops are reaped in the year, but not usually from the same land. In the area of the summer monsoon rains, one crop is generally sown in the early weeks of the monsoon (June and July), and reaped in October and November; the other is sown at the end of the monsoon and reaped from January to March. The latter, accordingly, is the winter crop; and as the winter throughout the

(625 square miles) available for the production of long staple cotton similar to that of Egypt (**365**). With the view of extending irrigation into the arid and frequently famine stricken tracts of Rohtak and Hissar districts in the south-east of the Punjab a project is now (1921) entertained for erecting at Bhakra, a point on the Sutlej nearly due west of Simla, a dam, behind which water would be stored to a depth of 360 feet above the river bed, and thus provide the means of irrigating about 1·4 million acres (2,200 square miles).

[1] Of the schemes of the kind formed primarily with a view to power development is that for the damming of the headwaters of the Koyna river to the south of Bombay, so as to render electrical energy available to the amount of 300,000 horse-power, and in connection with that to create a large new port at Ratnagiri in about 17° N.

[2] In 1911, 71 per cent.

north-western half of India is at least as cool as the summer of northern Europe, wheat, barley and linseed are among the winter crops of the region wherever the duration of cool weather is long enough to ripen them. A line drawn from Tāpti to the upper waters of the Mahānadi may be held to mark approximately the southern limit of wheat cultivation. The chief region of production of this cereal is in the Punjab and the United Provinces—that is, far in the north.

1054. Although wheat, largely in consequence of the extension of irrigation in the north-west, is an increasingly important export crop, it cannot be considered one of the characteristic crops of Indian agriculture. The crops that may be described as universal in India are millets, pulses, and oil-seeds; and except on the best watered plains, suitable for rice-growing, and in parts of northern India where a stronger grain is required, millets and pulses, along with garden produce, form the bulk of the food of the agricultural population. The most extensively grown unirrigated crop in India is the great millet, here known as *joār*; the millet next in importance is the smaller spiked millet, or *bajra*; and the principal pulse is, as in Spain, the chick-pea or *gram*. In all, fourteen cereals are cultivated, and nine different kinds of pulse. The oil-seeds most extensively grown are sesame, linseed, castor-oil, mustard, and different kinds of rape. The largest export under this head is that of linseed.

1055. Opium cultivation has its chief seats in the valley of the Ganges round Patna and Benares, and in Central India in the region corresponding to the old kingdom of Malwa. Cotton (**361-4**) is mainly grown on the southern tableland, and above all in that series of fertile plains opened up by the railway that ascends the Tāpti valley—that is, the plains of Khāndesh in Bombay, and of northern Berār, both lying on both sides of the Tāpti, and those of the Wardhā in the west of the Central Provinces. It is likewise largely grown on many other parts of the tableland—wherever, indeed, there is found the black soil referred to in previous paragraphs (**362, 1048**). Oil-seeds, the most important of which are linseed, rape-seed, and sesame, are very widely grown, but principally in the hinderland of Bombay (**70**). Regarding rice, jute, tea, lac, coffee, and indigo, nothing need be added to what will be found under these heads elsewhere in the book; and among the vegetable and animal products not mentioned in the table, reference may also be made to cinchona, silk, and pepper, all of which are likewise treated separately. The import tables show that India is largely dependent on other countries for supplies of sugar. Sugar-cane is, however, largely cultivated in the northern plains, and sugar is also derived from palms, chiefly in southern India, and the native production is equal to at least 95 per cent. of the total consumption.[1]

[1] Under a law passed in 1898–99 countervailing duties were imposed on bounty-fed sugar. This was followed in 1899–1900 by a great decline in the total amount imported, especially in the imports from Germany and Austria-Hungary, but in

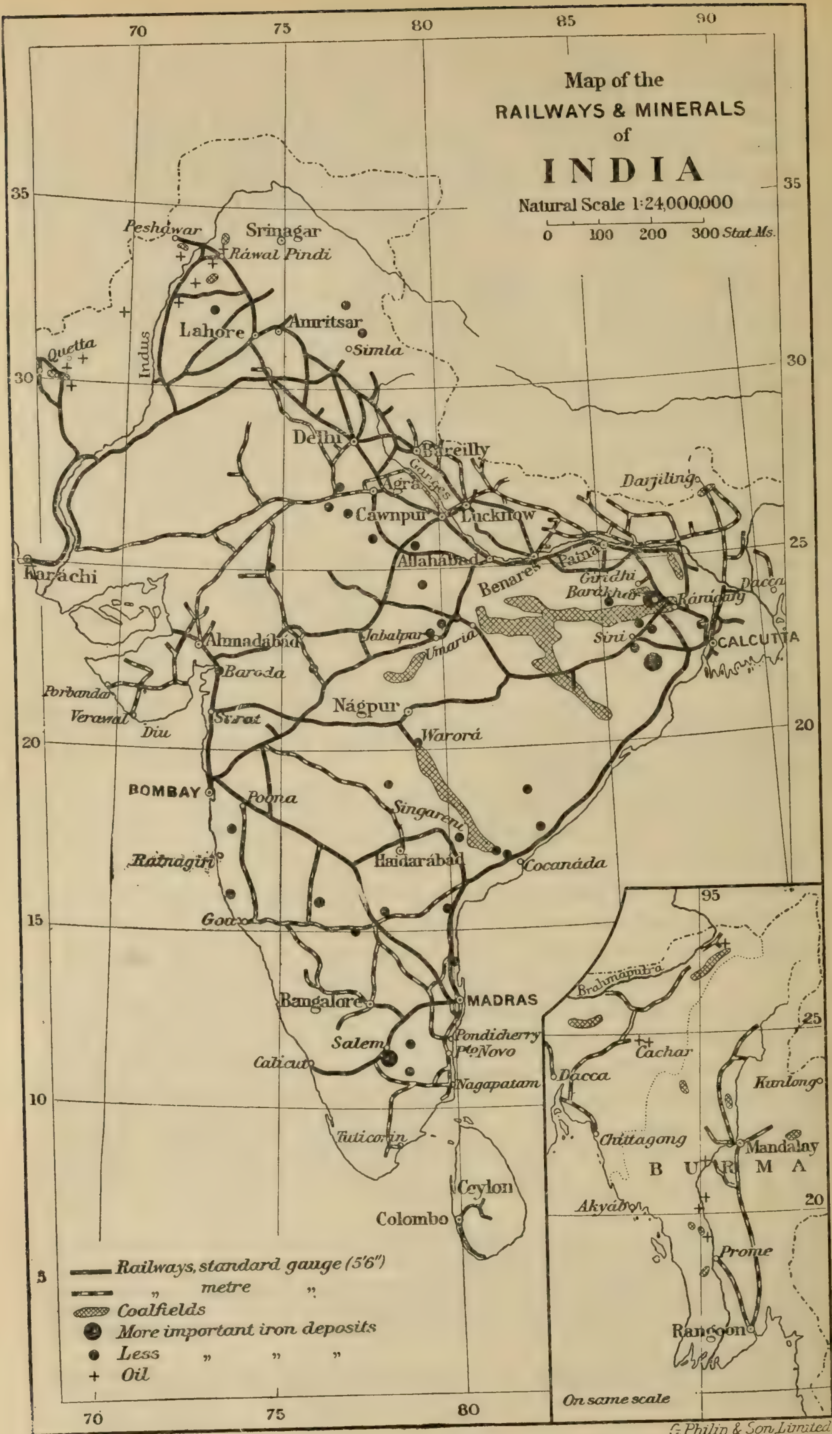
With respect to the export of hides and skins, it should be explained that cattle are the chief beasts of draught and burden in the greater part of India, but that in the wet plains of eastern Bengal they give place to buffaloes. The great **cattle-rearing region** of India is a belt extending from Cutch, through eastern Rājputāna and the Punjab, to Kashmir, a belt in which the rainfall is not so excessive as to wash away all the saline constituents which are found to be so essential to the health of cattle.

1056. The **mineral wealth** of India is tolerably abundant. As shown in the map on p. 510, both coal and iron ore are widely distributed, but of the coalfields the most extensive, in the west of Bengal and the east of Central India, lie mostly in a region imperfectly explored and not easily accessible, and the bulk of Indian coal is able to do only from one-half to two-thirds of the work of imported English coal. The most productive parts of the chief coalfield lie in the Damodar valley belonging to the basin of the Hūglī, where about four-fifths of the coal raised in India is produced. Rāniganj, about 120 miles north-west of Calcutta, was long the principal coal-mining centre, but the production of this field has at last been eclipsed by that of the Jherria field, about 40 or 50 miles further west. On the tableland three important coalfields are now connected with the Indian railway system. One is that at Umarīa, east of Jabalpur; another, that of Warorā, in the Wardhā valley; and the third that of Singareni, in Haidarābād. Another coalfield in the east of Assam is connected by rail with Dibrugarh (**1043**).[1]

1057. Iron ore is widely scattered over the mountainous and hilly parts of the country, and with the profuse employment of charcoal for smelting the natives make ore of excellent quality. But this expensive mode of working has, in the districts most accessible to foreign commerce, been almost superseded by the import of European iron and iron wares, followed by the development of the same methods in India. Of the earlier attempts to introduce the modern processes of smelting in India the most successful has been that of the Bengal Iron and Steel Co. near Barākar in the north of the Rāniganj coalfield, where ores are obtainable, and a suitable coal for smelting is procured at Karharbāri or Giridhi. For many years little progress was made, but in the early years of the present century the company began to supplement the local clay ironstone ores with magnetites obtained in Chota Nagpur, and since then its success has been decided. Recently,

the two following years the total imports were larger than ever. Even before the war the German contribution had come to be comparatively small, and though that of Austria, almost all coming from the present Czechoslovakia, remained considerable, India's chief import under this head has for a good many years been from Java (which furnishes by far the largest proportion of refined sugar), followed by Mauritius.

[1] For further particulars see *Geographical Journal*, vol. xliv. (July 1914), pp. 82–5.



Longmans, Green & Co., London, New York, Bombay & Calcutta

however, a more promising attempt has been made by a native (Parsī) company, which has obtained leases in the only two areas in which, according to *The Iron Ore Resources of the World*, the concentration of iron oxides into rich massive ore bodies has been proved. One of these is in the northern part of the Mourbhanj or Mayurbhanj state of Orissa,[1] and the other in the Raipur district of the Central Provinces. The company is already utilising the former ores at Sakchi or Jamshedpur, a place founded in 1910 amidst barren scrub in the angle to the east of Sini, where the Bombay-Calcutta railway forks for Calcutta and Asansol. The place chosen is only 45 miles from the Orissa ore-fields and 115 miles from the Jherria coalfield and within easy reach of limestone and manganese. Since then even more important deposits of iron ore have been discovered in the British district of Singhbhūm, to the south-west, where the company has obtained a concession in which, it is said, a ravine cutting across the ore range shows a continuous thickness of 700 feet of hematite, containing more than 60 per cent. of iron. Even before this last discovery, blast furnaces and rolling mills were erected,[2] and Jamshedpur has grown into a great industrial centre, producing not only a great variety of articles in iron and steel, including mill and electrical machinery, but also heavy chemicals, fertilisers, and explosives.[3] The large demand for tin-plate by the Burma and Anglo-Persian Oil Companies has led to the erection of plant in Bengal capable of manufacturing about 30,000 tons of tin-plate annually. Silver, though till recently the standard metal of the country, is nowhere found, but gold is mined to a considerable amount. The chief mines are in the Wainād district in the Western Ghāts near the Nīlgiri Hills, and in the east of Mysore (Kolār). Copper is abundant in the Himalayas from Kumaun to Darjīling, and is likewise found elsewhere. Salt in India, as in all vegetarian countries, is a necessary of life more urgently required than in countries in which more animal food is consumed. It is obtained by evaporation all round the coast, and also from inland salt lakes in the arid region of the west, and is quarried in the form of rock-salt in the Salt Hills in the north of the Punjab. It is also imported (**570**). The duty on it is an important source of revenue to the state. Manganese is now an important product near Nāgpur, in the Central Provinces, in Central India, and near Vizianagram in Madras. The deposits in the Central Provinces began to yield only in 1901, but

[1] The quantity of high-grade ore here is estimated as at least 260 million tons.

[2] The first steel was produced in 1913 to the amount of 63,000 tons, and this increased annually to 114,000 tons in 1917. Only about 2 per cent. of Europeans are included among the thousands of the company's employees, the remainder coming from various parts of India.

[3] Another scheme is for the utilisation of the excellent iron ores that crop out in a ring round the sides of an isolated hill near Salem in southern India. These ores it is proposed to convey to Madras (200 miles) and thence to Calcutta, where they would be smelted with coal brought from Giridhi with the aid of limestone as a flux brought from the eastern side of the Bay of Bengal.

are now much the most productive. The ores worked are very rich, the low grade ores not paying the cost of working. Mica is largely produced in northern Bengal. The extraction of saltpetre (nitrate of potash) from saline deposits in the plains of northern Bengal has declined from various causes, but chiefly in consequence of the fact that it is now more cheaply prepared from Chile saltpetre or nitrate of soda. Though the map shows many places in which mineral oil is found, its production is important only in Burma.

1058. Not only in metal-working, but also in various other branches of manufacture, the Indian handicrafts have suffered greatly from European competition, as the table of imports on p. 715 pretty clearly shows. Cheap Manchester cottons, and more recently the products of the native cotton factories[1] of Bombay (**377**), have told heavily on the old hand-spinning and weaving. Even the fine muslins of Dacca (Bengal) and Madras, for which India has long been celebrated, have almost become a thing of the past. In the making of various articles of luxury and art, however, Indian artisans still excel. Silk-factories worked by steam have been started at Bombay, but the making of richly figured silks by hand is still carried on to a large extent in Murshīdābād (Bengal), Benares (United Provinces), Ahmadābād (Gujerat), Trichinopoli (southern Madras), and other old towns of note. Cashmere shawls are still made both in Kashmīr and the Punjab (Amritsar, Ludhiāna, and elsewhere). Indian carpets and rugs are articles of export, and so also are a variety of articles skilfully wrought in ivory, gold and silver, copper and brass, but the quality of many of these articles has been greatly injured through the want of taste in European purchasers. The cotton and silk factories and the jute factories of Bengal (**439**) are an illustration of the growth of the modern spirit of commerce in India, which is shown also in the rapid increase in the number of native joint-stock companies. The cotton mills are mainly in native hands, but the jute factories are mostly the property of British capitalists.[2] It may here be added that in the Bombay factories work can be carried on all the year round without artificial light. (Comp. **671, 930.**)

1059. It will be observed from the tables in the Appendix that

[1] Under the present Indian Factory Act, which came into operation on July 1, 1912, children cannot be employed in factories under the age of nine, or for more than six hours in any one day; for women the hours are limited to eleven per day, and for all others to twelve hours. Early in 1921, both houses of the new Indian Legislative Assembly passed a resolution advising the Governor-General in Council to give effect to the recommendations of the Washington Conference and in particular to raise the limit of age in factories employing more than twenty persons to twelve.

[2] Under the tariff which came into operation on January 1, 1920, imported cotton piece goods are subject to a duty of $7\frac{1}{2}$ per cent. *ad valorem* without any corresponding excise tax, but cotton twist and yarn are still duty free.

Dacca	100,000	Trichinopoli	125,000
Benares	200,000		

one of the striking features of Indian **foreign commerce** is the large excess of imports of bullion and specie. The high proportion to the total value of the imports of other kinds of merchandise which this excess reached in the periods 1860–65 and 1866–70 is easily explained by the large remittances of specie in payment of the cotton imported from India in such large quantity during the American civil war and in the years immediately subsequent; but it is obvious that the continuance of a greater or less excess under this head points to the steady accumulation of specie (formerly silver, now chiefly gold) in the country. Another noticeable fact is, that even when the excess of the import of treasure is added to the value of the import of merchandise, the Indian imports are still far below the exports in value. The explanation of this difference is found in the necessity of exporting, either in treasure or in goods, enough not only to balance the imports, but likewise to pay the home charges of the Indian government, pensions, and the cost of carriage of exports.[1]

1060. The foreign sea-borne commerce of India proper (exclusive of Burma) is almost confined to four **seaports**—Calcutta, Bombay, Madras, and Karāchi (Kurrachee), and more than 80 per cent. of the whole falls to the share of the first two.

Calcutta, on the Hūglī, an arm of the delta of the Ganges, is the last of a succession of ports which have flourished on the same stream.

[1] In view of the increasing proportion of the trade of India, especially the export trade, carried on with other countries than the United Kingdom as shown in the table in the Appendix, some particulars as to the trade as shown in the trade-returns for 1912–13, will probably be found of interest. Of the raw jute exported, 39·9 per cent. went to the U.K., Germany took 21 per cent., the United States took 14 per cent., while France, Austria-Hungary, and Italy took respectively 10, 6, 5 per cent. of the total. As a market for gunny bags Australia came first, while the U S. took over 65 per cent. of the gunny cloth. About 15 per cent. of the rice went to the Straits Settlements, about 14 per cent. to Ceylon. Of oil-seeds, the U.K. is the principal buyer of linseed, taking 31 per cent., but Belgium with 24 per cent. and France with 20 per cent. are close competitors. Germany took about 10 per cent. and Italy nearly 7 per cent. The largest buyers of rape-seed are Belgium, France, and Germany. Sesamum goes mainly to France, Belgium, and Austria-Hungary; poppy-seed to France and Belgium; castor and cotton-seeds to the U.K.; ground-nuts to France, and copra to Germany. Japan was the chief market for raw cotton, taking nearly 48 per cent.; the rest was widely scattered, but the U.K. only took about 4 per cent. Raw hides and skins went mainly to the U.S. and Germany, those dressed and tanned mainly to the U.K. Tea went chiefly to the U.K. (nearly 72 per cent.), Russia coming next as a market with 12 per cent. The U.K. with nearly 72 per cent. was the chief market for Indian wheat, Belgium and France coming next. Of the imports of India, the U.K. furnished all but a small fraction of the cotton piece goods, and nearly 88 per cent. of the cotton twist and yarn. Of iron and steel goods the U.K. supplied nearly 59 per cent. of the total, Belgium and Germany being nearly equal with 17 per cent. each. As to sugar see separate note on pp. 508–9. Railway plant and rolling stock came mainly from the U.K. Of woollen piece goods, U.K. supplied 69 per cent. of the value, as against 20·2 per cent. supplied by Germany. Of the coal, the U.K. supplied only 26 per cent., Natal supplied 17 per cent., Japan 16 per cent., and Australia nearly 15 per cent.

Calcutta (with suburbs)	1,225,000	Madras	500,000
Bombay	1,000,000	Karāchi	150,000

The others, all of which stood higher up, have declined in consequence of silting, and the same fate is averted from Calcutta only by great engineering works. Founded in 1686, the town was made the seat of government of Bengal in 1772, and of British India in the year following. It remained the official capital of the Indian Empire till October 1, 1912, when it was replaced by Delhi.

1061. Bombay—by far the most important seaport in the west of India, and the rival of Calcutta in commerce and shipping—is likewise a town of recent origin, and a port that has had great predecessors in the same district. The predecessors of Bombay as a seaport were Broach, near the mouth of the Narbadā, and Surat, near the mouth of the Tāpti; and the history of the three illustrates in an interesting manner the relation between physical features and commercial development. Broach is the oldest of the three. Under the name of Barugaza it is one of the oldest Indian seaports known in commerce with the east or west. Yet it seems always to have had a poor harbour, very difficult to approach. Its difficulty of access is at least mentioned as far back as the first century A.D. But in days when vessels were very small, and navigation slow, the shallowness of the river-mouth and the delay in entering were of very little consequence; and the mouth of the Narbadā has the advantage of possessing high banks out of the reach of flooding, and being contiguous to a highly productive region. Surat shares with Broach the last-named advantage, and it has much better accommodation for shipping. The Swally (Suwāli) Roads, north of the mouth of the Tāpti, afford a safe anchorage even for large vessels from October to April, though it is dangerous for such vessels during the prevalence of the south-west monsoon. The banks of the Tāpti, on the other hand, are low and liable to inundation, a disaster which has more than once overtaken the town. The advantage of the harbour, however, began to prevail in favour of Surat in the sixteenth century, when direct commerce with Europe had begun. The Portuguese, the Dutch, and the English established factories (that is, trading stations) here, and in the seventeenth and eighteenth centuries Surat was the greatest seat of foreign commerce, and, latterly at least, the most populous town in India. Bombay, built on a small island, now connected, along with another larger island (Salsette) behind it, with the mainland, has the immense advantage over both its predecessors of possessing a harbour safe for large ocean-steamers in all weathers; but it had the misfortune to be backed by mountainous country, which cut it off from the more productive regions beyond. In 1661 Bombay Island was acquired by Charles II. from the Portuguese, and in 1687 the East India Company, to which it had previously been handed over, transferred thither, from Surat, the head-quarters of their possessions; but it was not till after the establishment of the improved communications with the interior mentioned

Delhi . . .	250,000	Surat . . .	120,000

above (1045) that Bombay rose to the commanding position it now holds in the commerce of India. Its two famous predecessors are now visited only by coasting vessels, but the inland trade of Surat is still important.

1062. Karāchi stands on a small bay to the west of the mouths of the Indus, and has been provided with a splendid harbour. Its wheat trade especially has recently grown with remarkable rapidity, all the more since the planting of the irrigation colonies in the north-west, and is now exceeded only by that of Bombay among Indian seaports. During fine weather vessels of any size can make use of the port, but during the south-west monsoon no vessel drawing more than 26 feet can enter or leave without special authority from the port officer.

1063. Most of the other seaports of the west coast have only fair weather harbours—safe in our winter months, but rendered dangerous by the heavy surf during the prevalence of the south-west monsoon. The harbour of Goa (Portuguese) is an exception, and the trade has begun to revive since Mormugão, at the south-west extremity of the harbour, has been connected by rail with the interior, as shown on the map on p. 510. Calicut, which has an anchorage 24 feet deep at low water spring-tides, and Cochin, which has a harbour available for ships of no more than 15 feet draught, still retain some importance in connection with the trade in pepper and spices, which drew the Portuguese to these ports at the end of the fifteenth century.

1064. The extraordinary importance of the trade in pepper and spices in past times it is difficult for us now to realise. The quantities that reached Europe were small compared with those which make up the trade of the world in such commodities at the present day, but the differences in value at the place of origin and in Europe enabled those merchants who escaped the risks of the trade to reap enormous profits. The cargoes brought back by Vasco da Gama after the voyage on which he discovered the sea-way to India were mainly of spices and pepper, and they are stated by Correa, the Portuguese historian of the voyage, to have yielded a profit on the voyage of 6,000 per cent. In Thomas Mun's *English Treasure by Forraign Trade*, written about 1630, the price of pepper in the East Indies is stated to have been 4*d.* a pound when it was 20*d.* in England. In a recent year the average price of pepper at Bangkok was a little more than 7*d.*, when it varied from 8½*d.* to 9¼*d.* in the London market.[1] As to the risks of the trade in past times, see par. **164.**

1065. The south-east coast, where a low plain slopes gently out under a shallow sea, did not possess till recently a single safe harbour or navigable river-mouth. Ships anchor off the shore at several roadsteads, and goods and passengers have generally to be landed in flat boats through surf. Madras has been made a seat of great

[1] *Foreign Office Reports, Ann. Series*, No. 2,898, p. 6.

Calicut . . . 75,000

trade, a trade, however, of less than one-sixth of the value of that of Bombay, notwithstanding the populousness and productiveness of its hinderland, and even this has been achieved only by waging a constant struggle against natural conditions. The site of the city was ceded to the English East India Company in 1639, when Fort St. George was erected there. About a hundred years later Madras was already the most populous city in southern India. Down to the latter part of the nineteenth century, however, the trade was carried on in the same manner as at the other ports on this coast. In 1881 a harbour was nearly completed, when it was in great part destroyed by one of those irresistible hurricanes by which both sides of India are liable to be swept, especially about the change of the monsoons (May and October), and which on the eastern side raise the waves to a height unparalleled elsewhere. A new harbour was, however, completed in 1895, two moles of about 3,900 feet in length being run out seawards leaving an opening of 515 feet between them; but great difficulty is experienced in keeping it dredged owing to the enormous quantities of sand drifted upwards and downwards by the monsoon currents.

The voyage from Madras to Europe or the reverse is considerably lengthened by the necessity of passing round the island of Ceylon, which is nearly connected with the mainland by a string of islands and a shallow bank known as Adam's Bridge.[1] Only one channel, called the Pāmbam (Paumben) Passage, across this 'bridge' has been sufficiently deepened to allow of its being used by good-sized coasters, and though dredging is still going on it is doubtful whether it can ever be made navigable for large ocean-going vessels.

The minor Indian seaports are Chittagong, on the north-east side of the Bay of Bengal; Cocanāda, at the end of one of the canals of the delta of the Godāvari; and Tuticorin, in southern Madras, on the Gulf of Manar, this last having a harbour 12 feet deep at low water, which enables it to carry on a considerable export trade (about one-third of the value of that of Madras).

1066. The landward foreign trade of India (not included in the tables in the Appendix) has a total value of from six to seven millions sterling each way, including the trade with Kashmīr.

The trade through the western passes, which makes up about 20 per cent. of the whole landward trade, has already been considered (**1039, 1040**).

The situation of many of the chief towns of India besides those mentioned in the text, and of the French possessions (Pondicherry, Karikal, &c.) and Portuguese possessions (Goa, Damān, Diu), is shown on the map on p. 510.

1067. Kashmīr is the westernmost of the states traversed by the

[1] The long-discussed proposal for connecting India with Ceylon by rail by this route has now been abandoned in favour of a part-rail part-steamer connection, which was established early in 1914.

Himalayas, and is mainly composed of lofty mountains. It includes, however, the lovely valley of the same name lying, at the height of rather more than 5,000 feet, in a latitude corresponding to that of northern Morocco. Srīnagar, on the Jehlam in this valley, is the largest town in the state and the centre of trade, the whole volume of which is also equal to about 20 per cent. of the landward trade of India. From Srīnagar there are several routes both south to the Punjab (the chief route being that leading to Amritsar) and north to the valley of the Indus : and from Leh, in the valley of the Indus in the east of Kashmīr, a trade-route diverges northwards to Eastern Turkistan, across the highest pass in the world so crossed. This is the well-known Karakoram Pass, 18,500 feet in height—that is, upwards of 6,000 feet higher than Leh, and upwards of 14,000 feet higher than the towns of Eastern Turkistan (**1120**). The chief articles of import into India from or through Kashmīr are shawl-wool (**323**) ; charas, an intoxicating drug made from hemp ; borax, and the precious metals. The exports, as in the case of all the other frontier states, include both European and Indian products.

1068. The native state of **Nepāl**, the populous parts of which lie south of the main range of the Himalayas, and have many routes to the Indian plains, absorbs more than half the landward foreign trade of India. The chief imports therefrom are food grains, oil-seeds, timber, cattle, and horns. From Khātmāndu, the capital, two routes branch over the central range of the Himalayas, and by means of these a small trade is carried on with Tibet.

1069. With **Sikkim**, **Bhutān**, and the north-eastern states beyond the frontier of Bengal and Assam, the trade is very trifling, but hope is entertained of developing a considerable trade with Tibet by a series of easy passes known to exist in Sikkim. These passes, about 13,000, 14,000, and 15,000 feet high respectively, would afford communication with the most productive part of Tibet (**1121**), and on the Indian side are within a short distance of the railway to Darjiling.

1070. CEYLON. This island, a British Crown colony, about half the size of England, is mountainous in the south, a level wooded plain in the north. The south-west, which is the most populous region, gets the benefit of rain from both the south-west and north-east monsoons. Here the plains and lower hill terraces are covered with coco-nut plantations and rice-fields, belonging to the natives (Sinhalese), and the higher mountain terraces (below 5,000 feet) are laid out in plantations by Europeans, the nature of which is indicated by the export table in the Appendix.[1] (See also **398**, **410**.) The labourers on these plantations are mainly immigrants from southern India. The northern plains are arid and require irrigation. Nowadays they are

[1] Cardamoms and essential oils from cinnamon leaf are also important.

Srīnigar	125,000

very scantily peopled, but remains of gigantic reservoirs and other extensive ruins show that at one time the population in these parts was much denser. The island has many minerals, but at present a very pure graphite (containing more than 90 per cent. of carbon) is the only one of commercial importance. Pearl fisheries are carried on in the Gulf of Manar, but they are uncertain. In 1903 they began to prove successful after twelve years in which no pearl oysters were obtained. The abundance of coco-nut and other vegetable oils, including citronella and other perfuming oils, has given rise to a promising soap industry. The chief seaports of the island are Colombo, which is connected by rail with the European plantations, and Point de Galle on the south coast, which was a much-frequented port of call before the opening of the Suez Canal. On the east coast there is a fine harbour at Trincomali, but its situation at a distance from the chief seats of production causes it to be of little value for trade.

Colombo	200,000

INDO-CHINA

1071. Indo-China, also called the Eastern Peninsula and Further India, is the peninsula between India and China. It is now divided between Great Britain, Siam, and France, besides a few small native states, chiefly in the minor peninsula, called the Malay Peninsula. The British territory is made up of the former empire of Burma (which, as regards administration, forms part of British India), together with the Straits Settlements and protectorates ; the French of Lower Cochin-China, Cambodia, Annam, and Tong-king. The northern part of the interior, which is very mountainous, is occupied by Shans, partly belonging to British and partly to Siamese and French territory, but practically in a large measure independent.

1072. The mountainous character of a large part of the country, the existence of numerous extensive swamps in the more level tracts of the interior, and the defectiveness of the communications, go a long way to account for the low density of population, but among other causes have been devastating wars, inroads of robber bands from the mountains, and other consequences of the want of strong government. Since Lower Burma has been in the hands of the British, there has been a constant stream of settlers southwards and westwards, as well as of emigrants from India proper into that territory, and population, production, and commerce have rapidly increased. Owing to the scantiness of population relatively to the resources of the territory at the time of the British occupation, Burma is to some extent in the position of a new country. 'There is plenty of good land to be had for the asking, on payment of a moderate tax.'[1] This leads, when security and a market are offered, to the rapid occupation of the land for the raising of export produce, principally rice (**417**, **421**).

1073. With regard to the communications of the peninsula, it is noteworthy that some of the chief rivers are very defective as waterways. Above the large delta in Tong-king the Song-hoi is navigable for steamers to within the Chinese frontier ; but the longest river of the peninsula, the Mekong, has its navigation greatly impeded by rapids, the lowest of which are situated to the south of the Siamese-Cambodian frontier. The Menam is navigable for steamers only to the

[1] Sir Ch. Bernard, in *Scot. Geog. Mag.*, 1888, p. 74. This can hardly be true now, for in 1899–1900 more than 90 per cent. of the surface both in Upper and Lower Burma was in the hands of peasant proprietors. These provinces, however, still continue to show the most rapid increase of population in British India.

confluence of the two main headstreams, which meet to the south of 16° N. ; and of these the eastern one is the only one navigable by boats. Timber (teak and sappan wood) is floated down the western branch from Raheng.[1] The Salwīn is scarcely navigable at all except at the mouth, and of all the rivers of the peninsula the Irāwadi is the most important for its navigation. This river is regularly navigated by steamers as high as Bhano, in about latitude 24° N., a distance of about 900 miles, but there the further progress of steamers is impeded by rapids. The Kyendwin or Chindwin, the chief tributary of the Irāwadi (right bank), is also navigated by boats, but is ascended with no little difficulty on account of the strength of the current, which makes it a matter of three weeks to reach a point about 250 miles up.

1074. The Irāwadi and Kyendwin are of high importance for the conveyance of the agricultural produce of the valleys, and the fact that they flow for the greater part of their course between ranges of forest-clad mountains gives them great value as carriers of timber. It is this circumstance that makes Burma the chief source of supply of teak. Although great forests of teak cover the Western Ghāts in India proper, and forests of other kinds abound in other parts of that country, Burma furnishes about 90 per cent. of the timber export (chiefly teak) of British India, and by far the greater part of that export comes originally from Upper Burma. (See also par. **484.**)

1075. The impediments to navigation in the greater part of the peninsula are not made up for by the existence of roads. The deficiency of labour and road-metal, and the obstructions arising from forests and swamps, are among the hindrances to the making of roads, so that where there are no navigable rivers goods are mostly carried laboriously and expensively on the backs of elephants, oxen, ponies, and other beasts of burden, or by human porters. Carts are an exception. The **railways** already in existence or in progress are shown on the map at pp. 536-7. The two starting from Rangoon, the principal port of Burma, run on opposite sides of the Pegu Yoma Mountains, which separate the valleys of the Irāwadi and Sitang, the one proceeding to Prome, an important town on the Irāwadi, and the other northwards up the valley of the Sitang past Mandalay, the capital of Upper Burma. Saigon, the chief port of Cochin-China, has been connected by rail with Mytho, on one of the main arms of the Mekong delta, although the Saigon river is likewise connected with the larger stream by a natural navigable channel uniting these two ports. The railway from Bangkok, the capital of Siam, to Khorat, running in part through a rich alluvial plain, was opened in December 1900,[2] and a branch

[1] In 1915 a comprehensive irrigation scheme was laid before the Siamese government for the irrigation of different parts of the Menam basin by an official lent by the government of British India.

[2] The conditions under which this railway may be extended to Saigon are now under discussion between the governments of France and Siam.

Bangkok . . .	600,000	Mandalay . . .	150,000

running northwards is ultimately to be carried to Zimme, Chieng-mai or Kiang-mai, a town lying in a fertile valley and long celebrated as a commercial centre.[1] This line it is proposed to carry as far north as Kiang-sen on the Siamese frontier. The railway running south-west from Bangkok towards Pechaburi passes through a rich agricultural district.

1076. Rangoon, the chief port of Burma, as already mentioned, stands on the Rangoon River, an arm of the Irāwadi delta, but one which is not navigable directly to the Irāwadi itself, although in the rains there is a navigable connection with that river. Two-thirds in value of the exports of Burma are shipped from this port, which is accessible at spring-tides to the largest vessels. Its health has been greatly improved by the introduction of a supply of pure water. Japanese have acquired large rice-milling interests at this port. The minor ports of Burma are Bassein, on a western arm of the Irāwadi delta ; Akyab, on the Bay of Bengal, the port of the division of Arakān ; Maulmain or Moulmein, at the mouth of the Salwīn, the chief port of the Tenasserim division, admitting vessels of 23 feet draught at spring-tides ; Mergui and Tavoy, still smaller ports on the narrower parts of Tenasserim further south. Maulmain, like Rangoon, can be kept open for large vessels, but much dredging is necessary at the former port to keep the approach free from obstructions.

1077. Besides rice and teak the products of Burma include cutch, rubber, petroleum, coal, gold, jade, rubies, tin, and wolfram. Petroleum[2] has long been a commercial product of some importance in both Lower and Upper Burma. It is obtained both from islands on the west coast and in the Irāwadi and Kyendwin valleys. Three coalfields are known in Upper Burma, that supplying the best coal being in the valley of the Kyendwin. Gold, jade, and rubies are all products of the northern parts of Upper Burma. The Burmese jade forms the chief supply of that mineral in the markets of China and Japan, where it is of great value. The ruby mines of Burma (at Mogok, a high valley to the east of the Irāwadi, about half way between Mandalay and Bhamo) furnish the only rubies of the finest colour to be found anywhere. The tin and wolfram (**571·19**) come from Tavoy.

1078. Bangkok is a bad port. A bar at the mouth of the Menam necessitates the discharge of cargo from ships drawing more than 13 feet in the Gulf of Siam. British shipping is declining at the port, the fundamental reason being apparently that British ship-owners are finding it more economical to work larger vessels than are suited to its trade. The town is now well provided with paved streets, and

[1] Before 1590 it was visited by Ralph Fitch (**1033**), who describes it under the name of Iamahey as ' a very faire and great towne, with faire houses of stone, well peopled, the streets are very large, the men very well set and strong.'

[2] See map, p. 510, and par. **554**.

Rangoon . . .	300,000	Maulmain . . .	50,000

has electric tramways and electric lighting, but pure water is still a desideratum.

1079. In Annam the chief port is Turan or Tourane, which lies on a bay about half a degree to the south of Huē, the capital of the province. In Tong-king the chief port is Haifong or Haiphong, which has been built by the French on former rice-swamps on the delta of the Song-koi, and is now a town lighted by electricity, with regular steamer services to Hong Kong, Pakhoi, and Hoi-hou (island of Hainan), and having the railway connections shown on the map at pp. 536–7. The railways are all on the metre-gauge. That to Hanoi, the capital of the province, crosses the Red River by a bridge more than a mile long. Hanoi itself is accessible to smaller sea-going vessels, and carries on direct trade with Hong Kong. Although on the site of the old town, it is entirely a French town, solidly and even almost magnificently built in European style, lighted by electricity and well supplied with water. Haifong is the centre of an important transit trade with Yünnan, from which are received tin, zinc, antimony, hides, horns, lacquer oils, in exchange for cottons and other manufactured goods, and since the completion of the railway from this port to Yünnan-fu in 1911 this trade has largely increased.[1]

1080. The Malay Peninsula is the name of that part of Indo-China which projects south-eastwards nearly to the equator. It is highly mountainous, and clothed with dense tropical forests, but at its northern end, at the Isthmus of Kra (between 10° and 11° N.), there is a gap separating the mountains of this peninsula from those of the main body of Indo-China. This gap is only about 100 feet in height at the highest part, and it has often been proposed to pierce this isthmus by a ship-canal, which would shorten the route from Calcutta to China by 660 miles and that from Burma to Bangkok by 1,300 miles.

1081. The peninsula is partly under British rule, partly divided among a number of small states. The states in the north acknowledge a certain allegiance to Siam, but those in the southern half are more or less under British influence. The island of Singapore in the extreme south, the small territory of Malacca on the west coast, and the island of Penang, with one or two smaller islands and the patch of mainland called Province Wellesley further north, form the British Crown colony of the **Straits Settlements.** The remainder of the south is occupied by the Federated Malay States of Perak,[2] Selangor, Negri Sembilan, and Pahang, and the protected states of Kedah, Kelantan, Trengganu, and Perlis, and the independent state of Johor, which,

[1] The French hope that by this means a large part of the trade of the fertile Chinese province of Sechwan will be diverted to Haifong, especially when this line has been continued, as it is expected it ultimately will be to Sui-fu on the Yangtse-kiang.

[2] The final *k* not pronounced.

however, has placed itself under British control as regards its external relations. The governor of the Straits Settlements also has under his care the Cocos or Keeling Islands, Christmas Island in the Indian Ocean, and Labuan. The natives of the peninsula are Malays, whence the name; but the Malays are being ousted in trade and industry by settlers of a more enterprising temperament. These are mostly Chinese, a particularly important section of the population, and Indians, the latter mainly from southern India, and known in the peninsula as Klings.

1082. Gutta-percha, rubber, cacao, pepper, and many other tropical products are obtained from the forests and plantations, but the chief export product is tin, for the mountains running through the peninsula and reappearing in islands further south (**1088**) are the richest part of the world in this metal. The wealth derived from these tin mines (**568**) has been the chief means of converting a proud and lawless people into a submissive and orderly community. It has rendered possible a capable and honest government, and has enabled native chiefs to see their interest in listening to the monitions of British residents clothed with little formal authority. Weapons, formerly universally worn, have been discarded. The prosperity of mining has encouraged the development of various agricultural industries. Short railways have been opened to several ports. A line running from Province Wellesley in the north to the south of the peninsula was completed in December 1908.[1] Commerce of various kinds has extended. Population has rapidly increased.[2] The largest supplies of tin in the peninsula are at present obtained from Perak, in the north-west of the British region.

1083. The Straits Settlements also derive great importance from their favourable situation for local and oceanic shipping. Malacca, captured by the Portuguese (Albuquerque) in 1511, and from them by the Dutch in 1641, was in the sixteenth and seventeenth centuries the chief centre of commerce in the Far East. In 1824 it was ceded by the Dutch to the British. Meantime, however, it had deteriorated as a port by the silting-up of its roadstead, and it was rapidly eclipsed by the port of Singapore, which was founded in 1819, on the island of that name, by Sir Stamford Raffles, who justly estimated the unrivalled advantages of the situation. Singapore is now, therefore, the great *entrepôt* and coaling-station of the Far East. Its harbour allows of ships with a draught up to 36 feet loading and discharging alongside of the quays. There are also large shipbuilding yards and means for efficiently repairing vessels of the largest size and their machinery.

[1] The continuation of this line by a bridge across Johor Strait to Singapore is under consideration.

[2] Population of Straits Settlements: 1871, 307,000; 1901, 572,000; 1911, 716,000, or including Labuan, 722,000. The Federated Malay States: 1891, 420,000 (approximately); 1901, 680,000; 1911, 1,037,000. The protected states: 1911, 720,000; Johor, 1911, 180,000.

There are large tin-smelting works both here and in Province Wellesley. Since the opening of the latter in 1903 Penang, which has an excellent harbour, has become the chief place of export of Perak tin. On the west coast of the mainland Port Weld, Teluk Anson, Port Swettenham, and Port Dickson are all convenient ports, above all Port Swettenham, the former Kwala Klang, in 3° N., which is described as the most commodious and best equipped port on the Malay Peninsula.

THE EASTERN, OR MALAY, ARCHIPELAGO

1084. The group so called embraces all the islands in the south-east of Asia, with the exception of those belonging to China and Japan, as well as of New Guinea and the islands immediately adjacent. The islands are almost entirely in the possession of European Powers, and the greater number belong to the Dutch. To the Dutch belong the Great Sunda Islands of Sumatra, Java, and Celebes, with the greater part of Borneo; all the Lesser Sunda Islands, except the north-east of Timor, which is Portuguese; and theirs also are the Moluccas which lie between Celebes and New Guinea. As regards commerce Java and Madura are the most important islands of the whole group. The possession of a rich volcanic and alluvial soil, combined with facilities for irrigation, confers great natural advantages, and these, together with the efficient system of government pursued by the Dutch, have enabled these islands, though only about equal in area to England exclusive of Wales, and thus containing less than one-fifteenth of the land belonging to the whole archipelago, to support more than half the population of the group. The density of the population in the islands exceeds that of England, and the number of the inhabitants is still increasing with great rapidity.[1] The great staple product of Java is coffee, but, as in Ceylon, this branch of cultivation has latterly been giving place to that of other tropical products, principally tea and cinchona. Of late years a variety of coffee known as robusta coffee, of African origin but apparently different from Liberian coffee, has been replacing other varieties.[2] It is less exacting than other kinds as to soil, climate, and treatment, and less liable to disease, but is inferior in quality, though improving. On the plains the cultivation of sugar-cane is rapidly extending, especially in the district round Surabaya, the chief eastern port. It is grown as a rotation crop on irrigated land, generally every second year, following rice. Cacao is also increasingly grown, and rubber, tobacco, and indeed all other tropical products are of more or less importance. Many of the coffee and cinchona plantations belong to the government, and are either cultivated for the government by natives, or are rented by private planters. The produce of the government

[1] Population of Java and Madura in 1880 under 20,000,000; in 1905, 30,100,000, or 590 to the square mile.

[2] In 1910 it furnished 11 per cent. of the total coffee crop of the Dutch East Indies; in 1920, 84 per cent. (*Bd. Tr. Jour.*, No. 1260, p. 66).

plantations is forwarded to the Netherlands by the Dutch Trading Company, founded at Amsterdam in 1824, and is there sold by auction. The dense population of the island causes the land to have a high value, but on the other hand affords abundance of cheap labour, and of this Dutch capitalists have taken advantage to increase in every way the yield of the land per acre. Nowhere in the tropics are science and business capacity more steadily devoted to agriculture, with results that are specially conspicuous in the production of sugar,[1] cacao, and cinchona.

1085. Batavia, on the north coast in the west of Java, is the capital of all the Dutch possessions in the East, and has a trade similar to that of Singapore. Its harbour having, like that of Malacca, become silted up, a new harbour (Tanjong Priok) has been constructed six miles away, which has a depth of 28 feet at ordinary spring-tides. On the hills to the south of Batavia, at the distance of about thirty miles, stands the charmingly situated town of Buitenzorg, a sanitarium for Europeans, and the seat of a palace of the Governor-General of the Dutch East Indies. Besides Tanjong Priok, Surabaya is the only harbour or roadstead on the low muddy north coast available during the wet monsoon (December to March). The south coast has in Chilachap, in about 109° E., the only natural harbour in the island.

1086. Besides Java the only islands belonging to the Dutch that need be mentioned on account of their agricultural commercial products are Sumatra, Celebes, Bali, and the Moluccas. Sumatra is a large island with a backbone of mountains in the west and an alluvial plain about 600 miles in length and from 60 to 110 miles in width on the east. This plain is, however, to a large extent marshy and thinly peopled, and the chief commercial product is coffee, obtained from the slopes of the western mountains. In the north-east, however, round Deli, the soil has proved to be admirably adapted for the cultivation of tobacco, which is hence rapidly extending here and leading to the neglect of this crop in other parts of the Dutch East Indies. The chief ports of Sumatra are Padang and Benkulen on the west coast, and Palembang on a navigable river traversing the eastern plains. A concession has been obtained for the utilisation of the water-power of the Musi above Benkulen for the manufacture of synthetic nitrogen. The surplus products of Celebes are obtained mainly from the peninsula of Menado in the north-east, where there is a rich volcanic soil, producing coffee and now also cacao. A considerable quantity of

[1] In the eighties of last century the sugar industry suffered simultaneously from the special severity of sugar-beet competition and from a disease known as *sereh*. Hence the production declined from 394,000 tons in 1884 to 332,000 in 1889, but since then there has been an almost continuous rise to 1,467,000 tons in 1911.

Celebes	2,400,000	Moluccas	600,000
Bali	1,400,000	Batavia	250,000
Sumatra	900,000	Surabaya	150,000

coffee is also produced in Bali. Macassar, in the south-west of Celebes, has a fine roadstead, and on that account, as well as because of the other advantages of its situation, is a place of great commercial importance.

1087. The Moluccas, or Spice Islands, are a group of islands of which the principal are Halmahera or Jilolo, Ternate, Tidore, Bachian, Buru, Ceram, Amboina, and the Banda Islands. They are still noted for the spices, especially cloves and nutmegs, to which they owe their name. Both Amboina and the Banda group (**475**) lie to the south of Ceram. The small islands of Ternate and Tidore, to the west of Jilolo, were each formerly the seat of a powerful sultan, and Ternate is still the centre of local trade in these Eastern waters.

1088. Besides agricultural produce the Dutch East Indies are of commercial importance from their mineral wealth. Till within recent years tin of the islands of Banka and Billiton, which form the continuation of the tin-bearing region of the Malay Peninsula, was the only mineral that had attained any great value in commerce, but now petroleum (**554**) is also a very important product. The Ombilin coal-field in Sumatra, in a mountainous district forty miles east of Padang, yields steam coal of fair quality, and has been connected with the new harbour of Emmahaven, five miles from Padang, by a railway, which also serves some fertile and densely peopled valleys in the volcanic area of middle Sumatra. Coal is also found at many places in Borneo at no great distance from the coast, both within and without the Dutch boundary. Immense deposits of iron ore exist in Celebes.

1089. The whole of northern Borneo is now under British protection. It is made up of a section in the north-east subject to the British North Borneo Company ; another, to the south-west, to the native sultan of Bruni ; and a third, Saráwak,[1] still further to the south-west, to a raja of British family. British North Borneo [2] has several safe and commodious natural harbours, though not as many as would appear from the outline on the map, some of the openings being encumbered with coral reefs. Sandakan, the capital, stands on one of the best of these on the north-east coast. Kudat Bay, on the north, also contains an excellent harbour. Both coal and gold are found, but the chief exports are plantation products, timber, and jungle produce. By far the most important is tobacco of high quality suited for cigar wrappers. Rubber, both from plantations and the native forests, jelutong (**448**), coffee, coco-nuts, pepper, and gambier are also exported, as well as gutta-percha, rattans, camphor, and a tanning extract derived from a mangrove exported under the name of cutch, though different from the cutch or catechu of Burma. A railway 110 miles long has been laid from Weston on Bruni Bay northwards to Jesselton on Gaya

[1] Final *k* is not pronounced.
[2] Judged by statistics, both British North Borneo and Saráwak appear to be prospering.

Bay through land well adapted for plantations. Twelve miles to the south are the famous birds'-nest caves of Gomanton, which yield an important export. The small island of Labuan to the west of Bruni, formerly a British Crown Colony, was handed over to British North Borneo in 1890 and then transferred to the Straits Settlements in 1906. It has a good port and coal deposits, the yield of which has lately been increasing. Saráwak, in which the river Rejang is navigable by steamers for 160 miles, has similar products to those of Borneo, pepper and sago being the chief, and it is the principal source of the gold of British Borneo. Its port is Kuching on Datu Bay, in the south.

1090. The Philippine islands, along with the island of Paláwan and the Sulu Archipelago, belonged till 1898 to Spain, but from that date have been a possession of the United States. They are volcanic and much subject to destructive earthquakes. The great bulk of the population of these islands inhabit Luzon, which is accordingly the only island of great commercial importance. The chief commercial products are Manila hemp (**141**), sugar, tobacco and cigars, and copra. An insect has for the present ruined the bulk of the coffee plantations. There are extensive sugar plantations in Luzon, Negros, Cebu, and Leyte, and sugar refineries at Manila and Iloilo, the latter in the south of the island of Panay, where there is also a government bureau of investigation for the promotion of the sugar industry. The highland provinces facing the northern part of the west coast of Luzon form an important mineral district said to be rich in copper, coal, and gold. Railways run both north and south from Manila, the capital and chief port of the entire group, the northern line going to San Fernando on Lingayen Bay, and passing through the chief hemp and sugar plantations of the island, and the southern sending a branch to the sugar growing centre of Batangas. The upper part of Manila Bay has, by the construction of a breakwater, been converted into an excellent harbour sheltered against the fiercest typhoons, but only vessels of 12 feet draught or less can come up the Pasig river to the quays of the port. Chinese immigration and industry have added greatly to the productiveness of the islands in recent years. The bulk of the trade, both outward and inward, is with the United States, with which alone there is free trade.

CHINA

1091. This vast country, an ancient empire down to February 1912, when the Manchu dynasty was overthrown and a republic proclaimed, is the only part of the mainland of Asia besides India with a population of high density. In this we see a result of the seasonal rainfall distribution. Though the winter temperatures are cool even in the south, and in the north and most parts of the interior rigorous [1] (**55**), the rains, occurring, as in monsoon regions generally, during the season of high temperatures, promote an enormous vegetable production. The figures given for the population of China Proper were formerly only vague estimates, but a recent census [2] confirms the previously entertained ideas as to the **great density of population** in most of the great eastern plain in the east, which stretches from the mountains in the north of Peking to those south of the Yangtse-kiang. This plain thus extends, roughly speaking, through ten degrees of latitude, from about 30° to 40° N., and its greatest width is about the parallel of 35°. It extends everywhere to the coast except in Shantung, the province which juts out between the Yellow Sea and the Gulf of Pechili. Another large and densely peopled plain lies on the middle Yangtse and the lower course of its great northern tributary, the Han. (See map, pp. 536–7.)

1092. Another region of high density is in the south-east, forming the province of Kwang-tung, which is largely composed of a deltaic alluvial plain ; and in the west there is a third region of exceptionally great density of population, in what is known as the Red Basin, in the east of the province of Sechwan and the north of Yünnan, where, besides great mineral wealth, there is a peculiar red soil of extreme fertility. West of the great plain, China is for the most part elevated and to a large extent mountainous, but even the elevated regions are in some places capable of supporting a numerous population. This is so, for example, in the region of the red soil just referred to. Where that soil is found cultivation can be pursued to a great height up the mountains ; and, according to Captain Gill, the Chinese in eastern Sechwan cultivate the hill-sides wherever the slope is not above 30°,

[1] The mean January temperature at Canton, on the Tropic of Cancer, about 55° F. ; at Zikawei (Shanghai), in about 31° N., 37° F. ; at Peking, in 40° N., 23° F.

[2] A statement of the area and population of the eighteen provinces of China Proper, according to the 1910 Census published in the *Government Gazette,* showed a grand total of upwards of 302,000,000, equal to an average density of about 200 to the square mile. The most densely peopled provinces were found to be Shantung with 430, and Honan with 330, to the square mile.

which, he remarks, is about the steepest a man can walk up unaided by his hands. To the west of this area an isolated level plain of somewhat more than 2,000 square miles in extent, formed of the bed of an old lake, has been irrigated from the waters of the Min, with the utmost care for upwards of 2,000 years, and 'everywhere covered with a verdure which would be monotonous were it not for the variety of shades' (Baber).[1] Towards the south-east of this plain lies the rich and populous city of Chengtu-fu.[2]

1093. The northern half of China again is covered, and vast hollows to a great depth filled, with a peculiar yellow soil known as lœss, which is also of remarkable fertility, and rewards cultivation even at great heights. Richthofen, who has described this soil in great detail, states that in the region where it prevails he has seen a plateau at the height of 7,000 feet above sea-level covered with fields and villages. This soil is light and easy to work, but it has one great drawback. Its productiveness, though often very great, is very uncertain. The soil is so porous that water runs through it with great rapidity, and crops are thus liable to suffer from drought unless refreshed with frequent showers or supplied with water by irrigation ; and so it happens that a region which, when rain falls with sufficient frequency, yields the most abundant crops, may in other seasons have its crops entirely destroyed, though the rainfall may have been plentiful enough for soils of another kind. Irrigation, therefore, is practised throughout this region wherever the structure of the ground admits of it, and lands that can be irrigated are in some places of ten or twenty times the value of 'dry' fields. Many parts of China are, like certain parts of India (**1049**), pitted with wells like a sieve, every field having one.

1094. Contrasts between N. and S. China.—While the general characteristics of a monsoon climate are found throughout China, there are necessarily considerable differences in different parts of a vast country ranging in latitude from about 18° to beyond 41° N. Differences in temperature will be taken for granted, but differences in the distribution of the rainfall should also be noted. Both in the north and south the average rainfall shows a decided culmination in the middle of summer and is very slight at the extremes of the year, but in the Yangtse valley the summer rains are more prolonged, and while the average maximum here also is in the middle of the year, there is a second period of heavy rains in September and October. Fifty years ago Baron Richthofen noted the somewhat marked contrasts for the most part directly or indirectly due to climate on opposite sides of the easterly continuation of the Kwenlun Mountains, that is, the Tsinling-shan and the Funiu-shan. North of that line of water-

[1] See an article by Mr. Arch. Little, accompanied by a map, in *The Scottish Geographical Magazine*, vol. xx. (1904), p. 393.

[2] Estimated population, 1,000,000.

partings lie the great lœss deposits described in the last paragraph, and these may be looked upon as the result of climatic influence, inasmuch as they are to be regarded as accumulations of dust brought from inner Asia by the north-west winds of the exceedingly dry winters. Filling up the hollows, these deposits give a remarkably uniform aspect to the surface features, except locally where the deposits are themselves cut by deep vertical-sided gorges. To the south again lœss is present only in isolated patches; mountains and valleys are fully formed. Lœss being unfavourable to tree growth, the mountain slopes are generally bare, whereas in the south they are luxuriantly covered with trees and shrubs as well as innumerable clumps of bamboo, without which, it has been said, it would be difficult to imagine how existence could be sustained, and expansions of the valley bottoms are filled with fertile alluvium densely peopled. The north is the land of wheat, cotton, and pod-fruits,[1] the south that of rice, tea, silk, tung oil,[2] and sugar-cane. In the north are wagon roads, in the south for the most part only narrow foot-paths and tracks for pack animals (comp. **1105**). In the north mules, horses, asses, and camels are used as beasts of burden, the first two also for draught. In the south asses and camels are unknown, and apart from the waterways, human porterage is the chief means of transport.[3]

1095. Hitherto China has depended mainly on its agricultural resources, but its **mineral wealth** is known to be enormous. From the first of the tables on p. 236 it will be seen that the **coalfields** of China are estimated to contain a possible supply of coal greater than any other country in the world except the United States. These coalfields exist in many places where there is already a dense population, and much of the coal is of excellent quality. One coalfield about seventy-five miles north-east of Tientsin has long been worked on the European system, and has been connected by rail with a navigable river. Other small coalfields exist in the vicinity of Peking. Large coalfields containing both bituminous and anthracite coal, both excellent, lie in the west of the mountains of Shantung (now under Japanese control). But the great coalfields of China lie further in the interior The southern half of the province of Shansi has enormous deposits both

[1] These it is true are not confined to the north. They are all grown here and there in the south, though not on so large a scale. The high prices commanded by cotton since the war have led to a remarkable increase in the area under cotton (in 1911, 3·3 million acres, in 1916, 6·7 million acres), and most of the experimental stations established either by government or by private associations to promote the extension of cotton cultivation and the improvement of the fibre which is at present suited only for making coarse yarns, are in southern provinces. According to the statistics of the Ministry of Agriculture and Commerce (quoted in the *Manchester Guardian Weekly* of Nov. 11, 1920), the average yield of cotton per acre varied from about 390 lb. per acre to about 490 lb. in the three years 1914–16.

[2] A drying oil used for varnishing wood expressed from the seeds of a euphorbiaceous species (*Aleurites cordata*, Thunbg.).

[3] *China*, vol. ii., pp. 18–19.

of anthracite and bituminous coal at the height of between 2,000 and 3,000 feet above sea-level (see map, pp. 536–7). The south-east of this province forms one of the most remarkable mineral regions in the world. The anthracite extends over an area of about 13,500 square miles, but true anthracite occurs chiefly in two groups, and most of the deposit is only half-anthracite with from 87 to 89 per cent. of carbon and much ash. While the average aggregate thickness of the coal-seams is at least 40 feet, almost everywhere there is to be seen a seam of from 15 to 20 feet, mostly one from 20 to 30 feet in thickness. So frequently does the productive part of the coalfield crop out on the surface, that along one line about 200 miles in length an opening might be made direct into a seam of great thickness almost anywhere. The stratification seems to be undisturbed, and in many places it is nearly horizontal. Along the line, the limits of which are indicated on the map by two crosses, there crops out a seam of from 20 to 30 feet in thickness, with an easterly slope only just sufficient for drainage, and into this level adits could be tunnelled for miles to the west, so that once a railway had been constructed to the surface of the plateau the wagons could be run into the mines and loaded with coal for Peking or Shanghai direct. An outlying portion of this coalfield, known as the Chinghwa coalfield, lies at a lower level on the slope of the plateau in northern Honan. Moreover, this coalfield contains excellent iron ores, both in the north near Loping and in the south round Tsechou, as well as potter's clay.[1] In the south-west of the province are enormous deposits of salt,[2] and in the same province a large oil-bearing tract is said to have been ascertained. The whole of south-eastern Hunan has been described as one enormous coalfield, and the same description has been applied to eastern Sechwan and northern Yünnan. Sechwan is also rich in salt and iron ore, and Yünnan remarkably rich in copper, to a less extent in silver, while there are important tin and other mines near Mengtse or Mongtse in the south-east of the province. During the war China became the greatest producer of antimony in the world, the great bulk coming from the province of Hunan. The production of wolfram is also rapidly increasing.

1096. Though the iron ores of Shansi are of very good quality, and have been for hundreds of years the basis of a Chinese iron industry on a small scale, their mode of occurrence mostly in nodules of a few pounds to a few hundred pounds in weight, does not seem to be favourable to the development of a large industry of the modern

[1] See the full account of this coalfield in Richthofen's *China*, vol. ii., pp. 439-40, and 473, &c.

[2] The right to work the coal, iron, and mineral oil deposits of a large part of Shansi and northern Honan was conceded to a British company known as the Pekin Syndicate, and though the rights of this syndicate were afterwards resold to the provincial authorities, the syndicate, working in co-operation with an Anglo-Chinese corporation created in May 1915, still has extensive privileges in those areas.

type.[1] Of the numerous deposits of iron ore scattered over China, the only ones considered in *The Iron Ore Resources of the World*[2] likely to be developed on a large scale in the near future are the Ta-yeh deposits in Hupeh (1113) and ores associated with limestone widely distributed in Kiang-su chiefly near Nanking.

1097. The chief thing that has so far hindered the development of these resources is the want of adequate means of communication. Communications throughout the great plain of China are naturally easy. Inland navigation is carried on both by rivers and canals, and one great canal, 700 miles long, runs through nearly the whole length of the plain. Commencing at Hangchow, at the head of the inlet to the south of the estuary of the Yangtse-kiang, it crosses both that river and the Hwang-ho, and terminates at Tientsin, on the Pei-ho, the inland port of Peking. It was constructed in the early part of the seventh century, and is still a fine waterway as far as about 35° N., but to the north of that its navigation is much impeded. North of the Hwang-ho the Pei-ho and its numerous feeders in the plain of Chili or Pechili afford considerable facilities for water-carriage. Navigable rivers facilitate the communication between the great plain and the province of Kwang-tung. Two streams, each navigable nearly to its source, leading on different sides up to an easy mountain pass, called the Meiling Pass, on the northern frontier of the province named, connect the provinces of Kwang-tung and Kiang-si (the route from Canton to Kiukiang); and two others similarly connect Kwang-tung through Hunan with Hupeh (the route from Canton to Hankow).

1098. Between the east and the west of China, however, communication is not so easy. Three great rivers, the Hwang-ho or Yellow River in the north, the Yangtse-kiang in the middle, and Si-kiang or West River in the south, cross the country from west to east, but only the second of these is of great service for navigation. The Hwang-ho, well called 'China's sorrow,' is too rapid, too much obstructed by shallows, and too shifting in its course to be easily navigated. Its navigation is wholly interrupted in the easterly part of its course in northern Honan, and again on the greater part of its course on the western frontier of Shansi, where it plunges through a profound chasm; and, on the other hand, it is liable to cause terrible destruction by sudden changes of its bed in its course through the plain. At certain periods it has entered the sea by a north-easterly course to the Gulf of Pechili, at others by a south-easterly course to the Yellow Sea. By

[1] Such is the opinion expressed in *The Iron Ore Resources of the World*, vol. ii., p. 917; but a different opinion is expressed by a Swedish engineer, Erik T. Nyström, who has more recently examined this field, and looks upon it as one of the great future sources of iron as well as coal. See the notice of Nyström's monograph (*The Coal and Mineral Resources of Shansi Province, analytically examined*, Stockholm, 1912) in *Petermanns Mitteil.*, July 1914, p. 33.

[2] Vol. ii., pp. 917–21.

a change of this nature in September 1887 at least one million human beings are estimated to have perished. In January 1889 the river was again brought back to its previous course by which it entered the Gulf of Pechili.

1099. The Yangtse-kiang is an admirable watercourse as far as the town of Ichang in about $111\frac{1}{2}°$ E.—that is, for above 1,000 miles from its mouth. Thus far steamers have long ascended, and even ocean-going steamers can reach as high as Hankow,[1] 680 miles up, and there get loaded with tea and other products for Europe and America. Beyond Ichang, however, a series of difficult rapids impede the navigation for about 400 miles; and as the mountain tracks between Ichang and Chungking, the great river-port of Sechwan, are likewise extremely difficult, that rich province is in a large measure shut off from communication with the great eastern plain. Such commerce as is maintained with this region mostly follows the river route. Till recently it was carried on only in small boats of four or five to about ninety tons, in which the journey up between the ports above-mentioned occupies from three weeks to about fifty days, according to the state of the river, being longest when the river is high. The journey down takes from four to ten days. The packages of goods for this water trade have to be made of sufficiently small size for them to be readily lifted out, as at the most dangerous parts of the rapids the boats have to be emptied and dragged up. The freight varies according to the commodity, the state of the river and other circumstances, but is necessarily always high, notwithstanding the low wages of Chinese coolies.[2]

1100. This obstruction to communication is all the more serious from the fact that the provinces thus shut off from one another are mutually deficient in commodities which the others supply. Rich as the soil of Sechwan is, it is not suited to any great extent for cotton, which in China is mainly grown on the lœss. On the other hand, Sechwan is one of the richest of all Chinese provinces in silk, and both it and Yünnan are well adapted for opium. It has already been stated that valuable minerals also abound. Hence it is that, notwithstanding the existence of these obstructions to navigation, the river traffic on this section of the Yangtse-kiang is very active. No fewer than 5,000 boats are estimated to traverse this route each way in the course of the year. Yet, if we take the average cargo at 25 tons, this large traffic represents only about 125,000 tons either way—a small commerce for regions so populous and so much in need of each other's products. Small steamers have ascended this part of the river, but do not yet carry on a regular traffic. The first to ascend was a British steamer in 1898, but it was intended for local traffic on one of the

[1] A large British man-of-war has even ascended to this port.

[2] A few years ago the freight for a package of shirtings of about $1\frac{1}{4}$ cwt. was given at from 10*s.* 8*d.* to 12*s.*, or more than 4*d.* per ton per mile, more recently for cotton piece goods it was given at the equivalent of about 2*d.* per ton per mile.

navigable rivers of Sechwan above Chungking.[1] The most important of these are the Kialing or Siao-ho, which joins the Yangtse from the north at Chungking, and the Min, which has a navigable branch connecting the Yangtse with Chengtu-fu.

1101. The third of the great rivers above mentioned, the Si-kiang, is navigable more or less for the greater part of its course, but rapids impede the navigation at many places. These hindrances, however, are not of the same consequence commercially as those which occur in the course of the Yangtse-kiang.

1102. But even at their worst the rivers of China are better than any other means of inland communication. Clumsy carts are used in the north, but in the south there are comparatively few roads fit for wheeled vehicles. In general the cost of land carriage by any method appears to be upwards of 6*d.* per ton per mile, or about twenty to forty times as great as on a river of easy navigation,[2] a cost which must obviously confine to narrow limits the amount of traffic in bulky commodities.[3] This makes the invention of the motor-boat one of peculiar importance for China, rendering it possible to reach with tolerable rapidity higher reaches of the rivers than before. But the modern means both of production and transport were till recently regarded by the Chinese authorities with noted dislike, chiefly, it would appear, from dread, partly from contempt of the foreigner. All schemes for the extension of foreign trade in China had to overcome the resistance arising from this dislike, and special difficulties in doing so had to be encountered in consequence of the peculiar character of the **Chinese government,** which may probably be regarded as in a large measure the result of the remarkable geographical isolation of the country.

1103. Surrounded on the land side almost completely by mountains and highlands difficult to traverse and scantily peopled, China has had a separate history from all the rest of the world. It has developed a government which proved for many centuries well adapted to its own circumstances, but not adapted to the maintenance of well-defined relations with foreign countries which might claim to stand on an equal footing. A central government claims authority over the whole, but Chinese life goes on to a large extent independently of this central

[1] Early in 1910 a powerful tug steamer with flat bottom specially built in the United Kingdom to the order of a Chinese firm began to run on this stretch. Steamer traffic has since been continued on a small scale, and the great losses occurring in connection with the junk traffic, estimated to have amounted in 1919 to 60 per cent. of the cargo (see *Times Trade Supp.*, No. 103, p. 398), are inducing the Chinese to order more of such steamers.

[2] See the particulars collected on this head in a paper on 'The Resources and Means of Communication in China,' by the author of the present work in the *Geog. Jour.*, xii., pp. 503–6.

[3] No one could read the account of village dwellings, country roads, and ferries given in Chapters II., IV. and V. of *Village Life in China*, by A. H. Smith, D.D. (1899), without obtaining a lively impression of the privations of Chinese existence consequent on the deficiency in the means of communication.

government. Chinese dynasties have changed again and again, but Chinese life remains the same. There is apparently no country in the world in which a central authority is so much restricted by the customs and traditions of local government and local feeling. It has thus often happened that the central government in treating with foreign powers has entered into engagements which it has no power to make good against the passive resistance of the people. 'China,' it has been said, 'occupies the unique position of a state resting on moral force.'[1]

1104. Another difficulty arises from the mode in which the government officials are appointed. All offices are conferred (at least nominally) on successful candidates in examinations, but in fact great expenses are nearly always incurred before appointments are obtained, and the salaries of the offices are generally inadequate at once to meet the expenses of living and to recoup the holders of office for the outlay previously incurred. Of such conditions, corruption on the part of the great body of the office-holders has always and everywhere been the inevitable result. Illegal exactions on their part are generally winked at. Formerly this was a recognised moderate and tolerable evil, but intercourse with foreigners, raising in many cases the ambitions and increasing the expenses of the officials, is tending to make it intolerable.[2] The deep-rooted corruption, on the other hand, causes the officials as a body to be hostile to all foreign influences that might lead to reform. The official feeling towards foreigners is, however, only partially shared by the great body of the people, who in many cases show no unfriendliness.

1105. But in spite of all obstacles the irresistible pressure of circumstances has gradually been forcing changes both on the governing classes and the people generally. The opening from time to time of new treaty ports (**1113**) is one illustration of this. The needs of the central government favoured the adoption of the electric telegraph, and the establishment of arsenals provided with modern means for the manufacture of munitions of war in different parts of the empire. At first the official feeling was strongly opposed to **railways.** The first railway in China was a short line from Shanghai to its outport Wusung, opened in 1876, but it was purchased by the Viceroy of the province

[1] A. Michie, *The Englishman in China*, ii., p. 369. This view of Chinese government was first insisted on by T. T. Meadows in *The Chinese and their Rebellions, with an Essay on Civilization* (1856)—see particularly pp. 401, 511, 637, but it would appear to be confirmed by all who know China well. It is probably this traditional influence of moral force among the great body of the Chinese people that accounts for the real progress which recent observers have remarked on as going on in China in spite of all the defects of the new government—defects largely inherited from the old. Critics who compare the 'progress' of Japan in recent decades to the disparagement of China should remember that in a country so much larger and more populous than Japan, and with so peculiar a history, the difficulties are much greater than those encountered in the island empire.

[2] It should be mentioned that this corruption does not pervade the customs service or the more recently instituted salt gabelle, both under foreign administration securing adequate salaries for the employees.

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and torn up in the following year. Afterwards a railway was laid from the Kaiping collieries east of Peking to the mouth of the Pei-ho, and at a later date from this latter point to Tientsin. The continuation of the Kaiping line north-eastwards to Manchuria was afterwards encouraged by the government for strategic purposes. In 1897 Tientsin was connected by rail with Peking, and railway concessions have since been obtained for the vast projects shown on the accompanying map, as well as for others.[1] As soon as introduced both telegraphs and railways have always been eagerly made use of by the people. Commercial competition has led to the adoption of other European inventions. The increasing production of silk in Europe and Japan has induced Chinese producers to adopt silk-filatures (**338, 1112** *n.*) and the competition of India and Ceylon in tea has caused some Chinese growers to introduce leaf-rolling machinery. Cotton-mills equipped with the latest machinery and conveniences have been erected at Shanghai, Hangchow, Ningpo, Wenchow, Wusih, and elsewhere.[2] The last mentioned, situated on the Shanghai-Nanking railway, not far from Suchow, long an important seat of silk manufactures, may now be described as the industrial capital of Kiangsu. Extensive iron and steel works have been established at Hanyang (**1113**) and Dairen in Manchuria; great shipbuilding yards at Shanghai (**1113**). The demand for machinery, including electrical machinery, is growing rapidly. The lack of roads spoken of in par. **1094** as a marked feature of southern China is being made good, at least near the great cities, where there is an increasing demand for automobiles. Chinese students are making themselves acquainted with western science and learning in Europe, America, and Japan, as well as at colleges in their own country (such as the Nanyang college at Shanghai, one at Tientsin and the Shansi Imperial University founded in 1900), and an active and widespread native press is tending to bring about the same result.

1106. Increased facilities for commerce were given in 1898 by throwing open the navigation of the inland waters of China to foreign vessels, though the value of this concession was greatly diminished by the harassing regulations afterwards issued. In 1902 an important treaty

[1] 'Railway development in China has hitherto been complicated by the system of "Spheres of Influence," under which certain foreign powers claimed special rights in certain sections of the country and this policy has not only tended to produce international friction but has also proved an insurmountable obstacle to the creation of a unified national system' (Report of Dept. Overseas Trade [Cmd. 853], 1920, pp. 9–10). The average operating costs of Chinese railways amount to about 44 per cent. of the revenue, as against 52 in India and Japan, and 60 to 70 in Europe and America (*Ibid.* p. 10). Under an agreement concluded in 1920 the United Kingdom, the United States, France, and Japan are to have equal shares in loans to China for the development of railways and other means of transport.

[2] In 1911 the number of mill spindles in China was 832,000; in 1920, 2,225,000—a competition very keenly felt by Japan, whose capitalists are taking advantage of the more favourable conditions for spinning coarse yarns in China by setting up factories there.

was concluded between China and Great Britain, by one provision in which it is hoped that the internal customs duties on foreign goods, known as *likin* and by other names, at present levied at numerous inland barriers, will be entirely abolished. Under this treaty it is provided that from January 1, 1904,[1] *likin* and all other taxation on foreign goods shall be abolished in consideration of the payment on most of such goods of an import duty amounting in all to $12\frac{1}{2}$ per cent., instead of the 5 per cent. duty at present in force. Opium is still to be charged 33 per cent. *ad valorem*, with a surtax in place of *likin* and other internal customs. Native customs houses are, however, still to remain, both on the coast and in the interior, for the taxation of native goods not intended for export, and the Chinese government reserves to itself the liberty to recast the foreign export tariff so far as practicable with specific duties on a scale not to exceed 5 per cent. *ad valorem*, with a surtax of $2\frac{1}{2}$ per cent. in substitution for *likin* and all other internal taxation. Another important provision is the clause equalising the duty on goods carried by junks and sailing-vessels to that on goods carried by steamers. It is also provided that an excise duty equivalent to double the import duty at present levied is to be charged on all machine-made yarn and cloth manufactured in China whether by foreigners at the treaty ports or by Chinese anywhere in China, but this stipulation is not to apply to the Hanyang ironworks and other similar government works at present exempt from taxation, arsenals, government dockyards, &c. China also agrees to establish a national currency.

1107. It is probably safe to say that there is no country in the world in which the consequences of the extensive **introduction of railways and machinery** are likely to be more momentous. When we consider the nature of the climate (**1091**), favourable at once to energy in the people and productiveness of the soil, the nature and extent of the undeveloped resources, the great density of the population, the advanced state of civilisation, and the character of the inhabitants, who are distinguished not merely by the most assiduous industry but by a high degree of business capacity including remarkable fidelity to their pecuniary engagements,[2] we may fairly anticipate much greater re-

[1] An amended tariff was adopted in 1918, but this was expressly declared to be temporary, provision being made for revision within two years after the close of the war.

[2] Abundance of testimony could be adduced in support of this statement, and it may be worth while to quote the two following :—

'To crown all, there is to be noted, as the highest condition of successful trade, the evolution of commercial probity, which, though no monopoly of the Chinese merchants, is one of their distinguishing characteristics. It is that element which, in the generations before the treaties, enabled so large a commerce to be carried on with foreigners without anxiety, without friction, and almost without precaution. It has also led to the happiest personal relations between foreigners and the native trader. . . . Judicial procedure being an abomination to respectable Chinese, their security in commercial dealings is based as much upon reason, good faith, and non-repudiation as that of the Western nations is upon verbal

sults from the introduction into China of western methods of production and transport than those which we have witnessed in India. It is therefore worth while to look at some of the geographical conditions that are likely to affect the ensuing development.

1108. First, we must note that this development is sure to be to a large extent of an industrial character. The unutilised resources with which China is so lavishly provided are those which furnish the means for carrying on industries of the modern type. This must lead, as it has done in other parts of the world where similar favourable conditions exist, to a rapid multiplication of population on the coalfields. This population will be dependent on supplies of foodstuffs brought from elsewhere, probably from a distance, and it is extremely doubtful whether China itself will be able to meet this demand. The agricultural resources of China proper, if we may judge from the great density of the population,[1] would appear already to have been utilised to the utmost. China already imports considerable quantities of rice, grain, and flour, and it is significant that these commodities are still admitted duty free.

1109. A disturbance of the present conditions of industry is certain to ensue, and this disturbance will be the greater the more rapidly the development goes on. Many countries are likely to be affected thereby, some in one way and some in another, and it is scarcely possible to foresee how far they are likely to be affected favourably, how far otherwise. But the greatest effects will be in China itself. There, with all the benefits likely to follow from the industrial development and the improvements in the means of communication, large numbers of the population are likely to undergo the same hardships and struggles as have been endured elsewhere, while old domestic industries were dying out and changes were taking place in the centres and routes of trade. It is probably the anticipation of this that has led to the provision for the taxation of machine-made products in China in the treaty of 1902.

1110. The countries and regions favourably situated for supplying the future industrial population of China with food-stuffs will no doubt receive an important stimulus to settlement and production.

finesse in the construction of covenants.'—A. Michie (long a member of the Shanghai Chamber of Commerce), *The Englishman in China*, i., pp. 264–5.

'The British banking institution which I have represented at Hong Kong for the last seventeen years has carried out with its Chinese constituents commercial and banking transactions aggregating the equivalent of many tens of millions of pounds sterling. Yet in connection with that enormous business, the bank has not sustained the loss of a single coin.'—T. H. Whitehead (Member of the Legislative Council, Hong Kong), *The Expansion of Trade in China* (a paper read before the Incorporated Chamber of Commerce of Liverpool, February 8, 1901), p. 27.

[1] The figures in the note to par. **1091** give an inadequate idea of the extreme density of population in China. In one purely agricultural and quite typical district of northern China (the less favoured part of the country) an enumeration was made of the population within a radius of three miles, and the result showed a density of more than 2,000 to the square mile (A. H. Smith, *Village Life in China*, p. 19).

The already developed industrial countries of the world cannot fail to have some of their industries stimulated, and perhaps unduly, for some at least are likely to encounter at a later date severe competition in the country from which the stimulus proceeds. But that industrial China will ever overwhelm the world with its products, as some appear to think possible, is surely a vain alarm. 'People,' says Mr. H. Brenier, formerly director of the Lyons commercial mission to China, 'appear to think that we are going to put into the hands of the Chinese the powerful instruments of production which they lack, and that all the other conditions, which at present constitute a part of their advantages —low wages and a low standard of living, &c., will remain the same. That is opposed to experience.' [1] Efficient labour is indeed at present cheap in China, but its price is bound to rise when its total efficiency has been increased with the aid of machinery, just as surely as it has done in Japan,[2] and probably more rapidly. Details of life in China such as are given in the work already referred to (note to par. **1108**) make it hardly credible that improved means of production should not lead to the speedy growth of demands for a higher scale of living.

1111. Of the regions likely to be rapidly developed in the near future the most important is the coalfield of Shansi, and it may be pointed out that if a railway through this coalfield were provided with northern connections, it is probable that a great deficiency among Chinese products would be supplied by a railway following this route. In China proper there are very few sheep, and few animals of any kind yielding wool. Hence woollen garments are scarcely worn. But it must be remembered that the winter climate of a large part of China renders the use of warm clothing necessary. According to the present habits of the people, while cotton, China grass, or silk furnishes the material for the summer garments, the winter clothing of the rich consists largely of furs, that of the poorer classes of cotton padded and quilted. There can hardly be a doubt, however, that if woollen garments were sufficiently cheap they would form a suitable winter wear, and might in time to come be preferred to the padded clothes now worn. Now any northern branches of the railway at present under consideration would pass through a region thinly peopled indeed, but well adapted for sheep-rearing, and we have the example of Australia and the Argentine Republic to show us how rapidly a large trade in wool can be developed under suitable circumstances by a scanty population. It is not unlikely, therefore, that the establishment of cotton-mills in the northern parts of China would be followed by the rise of woollen-mills, supplies of wool being obtained from the interior tablelands of Asia within the borders of the Chinese Empire. There is already a small but rapidly growing export trade from Tientsin in

[1] P. 252 of a paper on 'L'Illusion jaune,' in *Annales de l'École Libre des Sciences Politiques*, Paris, 1898.

[2] See *n.* 3, par. 1131.

wool brought from Kansu, as well as across the mountain passes in the extreme north of China proper.

1112. Some of the anticipations expressed in the preceding paragraphs seem to be verified by the tables in the Appendix, though in comparing the earlier and later years it must be remembered that before June 1887 the trade carried on in native junks was not included in the returns. It should also be noted that the figures apply to the whole Chinese Empire and not merely to the eighteen provinces treated of in this section as China Proper, and include accordingly Manchurian trade. In the import trade one may also notice particularly the absolute decline in the import of opium, due partly to the greater production of this drug in China itself and partly, no doubt, to the measures taken against the use of this drug mentioned in the note to par. **387.** In the export trade one may notice that the diminution of the export of tea (**389**) has been arrested. The rapidly increasing export of beans and bean cake is from northern China and Manchuria. The growth of a manufacturing population is indicated by the rapidly rising imports of coal and coke, machinery and metals of all kinds as well as those of food-stuffs such as rice, flour, fish, and sugar, and as one indication of the same thing on the export side, attention may be called to the very rapid increase in the export of filature silk, that is, silk reeled by power-driven machinery as compared with hand-reeled silk.[1] As to the countries from which the imports are derived, light is thrown on the changes in the relative position of the United Kingdom, India and Japan, to some extent also the United States, by what is said in par. **377** as to the vicissitudes of the cotton industry. On the export side the great relative decline of the United Kingdom since 1876–80 is to be put down mainly to the change in the origin of our tea imports, and to the fact that then considerable quantities of raw silk still came to London for re-export. The rise of Japan is a natural result of the vicinity of that country, which serves as a market for many of the rising exports of China.

1113. The foreign trade is almost entirely carried on at certain **treaty ports (1116)**, which are the sole places at which foreign merchants are allowed to reside and own property, and foreign vessels allowed to load and discharge.[2] They now include all the chief seaports of China

[1] As showing the influence of the war on Chinese commerce it is worth while to mention that the six leading exports in 1919 in order of importance were beans and bean products (bean cake and bean oil—mainly of Manchurian origin), silk (almost entirely steam filature), raw cotton, skins and hides, and egg albumen and yolk. Wool, ground nuts, and even wheat flour were also considerable exports. This last item may seem remarkable in view of what is said at the end of par. **1108**, but with reference to it also we must bear in mind that the returns embrace Manchuria.

[2] Their number is constantly being increased. Fifty are enumerated in the Report already cited [Cmd. 853], and the most important of these are underlined on the map. In the lists of towns given at the foot of subsequent pages, they are distinguished by asterisks, and the populations given for these are on the authority of that Report, but always in round numbers.

and most of the principal river ports, and a few inland places. The seaports are most numerous on the south-east coast of China, where the numerous indentations form a number of excellent harbours, though the mountainous character of this part of the country greatly limits their hinderlands. The most important in the order from north to south are Hangchow **(1114)**, Ningpo, Wenchow, Fuchow, Amoy, and Swatow. Canton **(1114)** is not included here as having a situation of a different kind. There are very few treaty ports north of the Yangtse mouth, where the shores are for the most part of unindented alluvial land. By far the most important is Shanghai, the great port of the Yangtse-kiang, the most extensive and productive natural region of China. Its importance is increased by the great lack of seaports in the part of China lying north of the Yangtse, the coast line there being mostly low and uniform, like that on the east of the Indian peninsula. The mountainous Shantung peninsula is indeed more favoured, but the harbours there are too far from any important hinderland to acquire any great trade with the imperfect communications at present in existence. In consequence of these conditions Shanghai serves as the great *entrepôt*, not only for the other Yangtse ports, the chief of which are Chinkiang, Nanking, Kiukiang Hankow, Ichang, and Chungking, but for all northern China. Shanghai lies, however, not on the Yangtse itself but on a small tributary known as the Wusung or Hwang-pu, at the mouth of which is a bar preventing vessels of more than 24-feet draught from reaching Shanghai even at high water spring-tides. Larger vessels are compelled to discharge at least part of their cargo at the town of Wusung. The port is provided with excellent graving docks, foundries, forges, machine-shops and engine-works, and shipbuilding yards[1] under European management. Most of the river ports of the Yangtse have their importance determined at present by the extent and productiveness of the hinderlands opened up by waterways, and from the structure of the country it is probable that the introduction of railways will not greatly alter their relative rank. Chinkiang derives considerable importance from its situation near the junction of the Imperial Canal. But no river port has, or can have, the importance of Hankow,[2] at which the water-

[1] The Kiangnan dockyard, founded early in the present century, has already built ships of nearly 15,000 tons displacement, and a deadweight carrying capacity of 10,000 tons to the order of the United States Shipping Board (*Times Trade Supp.*, Sept. 25, 1920).

[2] Hankow, which suffered greatly in the rebellion of 1911, is only one, and not the largest, of three adjacent towns separated by rivers. Hankow is on the left bank both of the Yangtse and the Han, Hanyang on the right, and Wuchang opposite, both on the Yangtse. This last is the seat of the Viceroy of the province of Hunan and Hupeh. The population of the last two towns is not given in the

* Shanghai	1,000,000	* Chinkiang	170,000
* Fuchow	625,000	* Wenchow	125,000
* Ningpo	470,000	* Amoy	115,000
* Chungking	425,000	* Swatow	85,000
* Nanking	380,000	* Ichang	55,000
* Hankow	320,000		

ways of western China converge in such a manner as to make it the inlet and outlet of Hunan, Sechwan, Kweichow, the greater part of Hupeh, as well as of southern Shensi. The projected railways, it will be observed, tend to confirm the importance of this situation, but if Wuchang, on the opposite bank of the Yangtse, were also made a treaty-port, it is probable that after the introduction of railways the coalfields of Hunan would cause a very large part of the trade to be concentrated there. It is unquestionably the advantages of situation just pointed out that have caused Hanyang, opposite Hankow, in the angle between the left bank of the Yangtse and the right bank of the Han to be selected as the site of the first great iron and steel works [1] erected in China, although the materials of the industry have to be brought from a distance ; iron from Ta-yeh, fifty miles away, about fifteen miles from the right bank of the Yangtse, and coke from mines at Ping-hsiang in Kiang-si, 300 miles distant, where manganese ore is also obtained. The Ta-yeh ores are of excellent quality containing above 60 per cent. of iron and from 0·05 to 0·25 of phosphorus. Shasi or Shashi, one of the more recently opened treaty ports, about midway between Hankow and Ichang, has the advantage of two important canal connections. One canal runs thence eastwards to the lower Han, thus avoiding a great bend of the Yangtse. The other starts from the point of the river Yangtse opposite, and leads to the Tungting Lake in Hunan. Shasi has thus long been the centre of an enormous traffic in native junks, and as the neighbouring country is the most important cotton-weaving district in China, the cottons are collected, graded, and shipped at Shasi in large quantity. Chinwangtoa, on the Gulf of Pechili, is the port of the Kailan Mining Administration.[2]

1114. Of the southern seaports the most important is Canton, with a situation analogous, on the one hand, to that of Calcutta on one of the most productive of tropical deltas, and, on the other hand, to that of Venice, its internal traffic being carried on by waterways now threaded by numerous motor boats, while its narrow streets are still 'without a wheel or a beast of burden.' [3] Over Calcutta Canton has the advantage of better communications by water in different

Report cited, but the aggregate population of the three towns is variously estimated at from 1,000,000 to 2,000,000.

[1] Besides large blast furnaces these works include rolling mills which produce steel rails and other articles for home consumption. Much of the pig iron is exported to Japan, and some has even been exported both to New York and San Francisco.

[2] A Brito-Chinese undertaking which in 1919 produced about 4,000,000 out of the total of about 13,000,000 tons of coal estimated to have been produced in that year by modern methods, to which perhaps 10,000,000 tons were added by native methods. The port of Chinwangtao has depths alongside the breakwater up to 27 feet at low-water, ordinary spring-tides, with a range of 3 to 5 feet. Vessels up to 550 feet in length can be accommodated.

[3] Middleton Smith, *The British in China*, pp. 113, 124, where, however, we learn that a road 100 feet wide replacing the city wall is soon to encircle the town.

* Canton . . .	900,000	* Shasi . . .	105,000

directions, but it suffers from the great disadvantage of not being accessible to ocean ships of such large size as those which can reach Calcutta. All vessels drawing more than 16 feet have to lighten at Whampoa, fourteen miles below the port. Great improvements are now (1921) contemplated at this port, and if these are carried out and supplemented by railways in many directions Canton cannot but affect adversely the development of the trade of Hong Kong, although this latter port will still continue to be the most convenient *entrepôt* for the numerous ports of the south-east coast with small hinderlands limited by as yet unrailed mountains. Of the northern treaty ports Taku, the port of Peking, has a bar that prevents the access of vessels drawing more than 18 feet even at the highest spring-tides, and Tientsin can be reached only by smaller coasting steamers. The importance of this place is due to the traffic on inland waterways. The same is true of Hangchow, the great silk-manufacturing town to the south-west of Shanghai. The bay on which it appears to stand can be navigated to its head only by small vessels, and the town is cut off from this bay by an embankment to protect it from the violent bores which ascend the bay at spring-tides. Suchow, situated on Lake Tai-hu and the Grand Canal, also depends largely on water traffic, though it now stands also on the railway connecting Shanghai with Chinkiang, Nanking, and northern China. It no longer has the extent, populousness, or brilliance of Marco Polo's Suju, having suffered very greatly in the Taiping rebellion, but is still an important town. Of the inland treaty ports near the southern frontier, all small towns,[1] Lung-chow and Mengtse have been opened to facilitate trade with Tongking, Sumao or Szemao with Siam, and Momein or Tengyueh with Burma.

1115. Peking, the capital of the Chinese Empire, occupies a site of strategic importance with respect to the routes leading into China proper by Kalgan on the north-west and by the coast round the mountains on the north-east, but is situated on a plain far from productive, and consequently has a relatively small population. Sian-fu, the capital of Shensi, near the right or south bank of the Wei-ho (tributary of the Hwang-ho), occupies a plain of much greater productiveness, and lies in a situation which makes it an important centre of convergence of the trade routes of China. It is, however, cut off from central China by mountains, across which the lowest pass is about 4,000 feet in height, which makes it doubtful whether future railway connections will follow the present route across these mountains. Of the inland towns of the Yangtse basin not treaty ports, the most important are Siangtan and Chengtu-fu. Siangtan

[1] None credited with more than 15,000 inhabitants.

Siangtan	1,000,000	* Hangchow	680,000
* Tientsin	800,000	* Suchow	500,000
Sian-fu	700,000		

in Hunan is even more populous than Changsha, the capital of the province, situated lower down on the Siang-kiang. As to Chengtu-fu, capital of the province of Sechwan, see par. **1092.** Various schemes have been urged for getting access to this province by rail from Indo-China, but the routes are all extremely difficult. In this region a broken plateau, nearly conterminous with Yünnan and western Kweichow, 'having an average height of about 5,000 feet, and no communication by water with the plains that encompass it on the north, south, and east,' a plateau so broken as to have 'no level surface whatever, except an occasional lake basin,' extends for ten degrees of longitude between Indo-China and the Yangtse-kiang.[1] In these regions the three best routes have been examined by Europeans and declared virtually impracticable for railways, and there seems little probability that any one of them will be able to compete with a railway in the valley of the Yangtse-kiang.

1116. Reference has already been made in pars. **1006** and **1034** to the early relations of China with the west. In modern times the Portuguese were the first to establish direct trade relations with this country. This trade began in 1518, but encountered much hostility on the part of the Chinese. In 1557, however, they were allowed to settle on the island of Macao at the mouth of the Canton River, and in 1586 this island was definitely ceded to them in return for assistance rendered to the Chinese in putting down piracy. Both Portuguese and other foreigners were allowed to carry on trade at Canton, but under no formal treaty with the Chinese government before 1842. In course of time a large trade in opium grew up between India and China. This trade was contraband, and though the East India Company caused the opium to be grown expressly for the China market, it left to independent shippers the responsibility of introducing it into China. It was introduced by smuggling, which was corruptly connived at by Chinese officials. This state of matters was bound to lead to disputes, and ultimately it led to a war between China and Great Britain, at the end of which the five ports of Canton, Amoy, Fuchow, Ningpo, and Shanghai were opened as the first treaty ports, and the island of Hong Kong, at the north of the entrance to the Canton River, was ceded to the British. The opium trade was still declared to be contraband, and another war broke out in 1857, at the conclusion of which it was for the first time legalised. More treaty ports were then opened, and every difficulty between the Chinese and European governments was made the opportunity for exacting the opening of further ports. In 1898 the Germans, on the occasion of a difficulty of that nature, demanded and obtained the cession 'on lease' of the harbour of Kiauchow, with a small district round it on

[1] Report by Mr. F. S. A. Bourne of a *Journey in South-Western China* (China, No. 1, 1888 [C.–5371]), p. 10.

* Changsha . . . 540,000

the south side of the Shantung Peninsula; and this was followed by similar cessions to Russia of Port Arthur and the anchorage of Talienwan in Manchuria, to France of Kwang-chau-wan on the peninsula opposite the island of Hainan, and to Great Britain of Wei-hai-wei on the north side of the peninsula of Shantung. At the same time an addition was made to the Kaulun or Kowloon territory belonging to Hong Kong on the opposite part of the mainland. At the treaty ports the collection of the custom duties on behalf of the central government of China has long been in the hands of a foreign board called the Imperial Maritime Customs, presided over by an Englishman—a situation curiously analogous to that of the Staplers in past times in the trade of England (**764**). At the close of the Russo-Japanese war in 1905 China was obliged to cede to Japan all the rights that had been acquired by Russia in Manchuria, and in 1915 during the great war it had to make a similar concession of the rights acquired by Germany in Shantung.

1117. Since its cession to Great Britain **Hong Kong** has become the great *entrepôt* for southern China, and nearly all the direct foreign trade with that country is tending more and more to become concentrated there and at Shanghai.[1] The deep and commodious inner anchorage at Victoria Bay on the north side of the island makes it the port for all large ocean-going ships in connection with the trade of Canton. It has grown into a great centre of western industry and enterprise, seat of a great Chinese University, of great shipbuilding yards, and a variety of manufactures. Kiaochow Bay, now virtually Japanese, though shallow in its upper parts, has a good harbour[2] at **Tsingtao** or Chingtao at its mouth, and the railway connections now being established will probably give it the necessary hinderland for the development of an important trade partly in competition with that of Shanghai (not of Hong Kong). In southern China the French have established on a concession made to them on the east side of the Lei-chou peninsula the free port of **Fort Bayard** in 21½° N.

1118. THE CHINESE DEPENDENCIES. China proper is bordered on the north-east, north, and west by various territories more or less directly under Chinese rule. **Manchuria** is the most important of these. It lies to the north-east, and is the country from which the last Chinese imperial dynasty originally came (in 1644). It has mountainous country in the east and west, the eastern mountains being rich in places in coal[3] and iron. The intervening country, mostly level and to a large extent extremely fertile, is drained partly

[1] On the present conditions of trade with China, the *Foreign Office Report, Annual Series*, No. 1909 (price 5*d.*), is peculiarly instructive.

[2] The depths alongside the wharves vary from 22 to 31 feet.

[3] The Fushun colliery near Mukden, a Japanese undertaking, in 1919 ranked next after the Kailan Mining Administration in the production of coal in Chinese territory.

Tsingtao 80,000

by the Liau-ho into the Gulf of Pechili, partly by the Sungari with its tributary the Nonni into the Amur—all fine navigable streams. Notwithstanding its fertility it is still comparatively sparsely peopled, especially in its middle and northern portions, where some of its most fertile tracts are situated. It is hence likely to be one of the chief sources of food-supply for some of the future industrial regions of China proper. Chinese settlers have long been flocking into it, and the railways running through it, originally constructed by the Russians (**1012**), have hastened on this movement. In recent years the most remarkable feature of its trade has been the rapid growth of the export of soya beans principally to Japan, but also to Europe. Besides the capital Mukden, there are several others—Liauyang, Kwanchengtse, Kirin—estimated to have more than 100,000 inhabitants. Tiehling and Tsitsihar are at the head of navigation respectively of the Liau and the Nonni. The new towns which grew up along the railways under Russian auspices are all solidly built and provided with the latest conveniences of European cities. The most important of these is the new Harbin (a short distance from the old town of that name), situated where the railways diverge for Vladivostok and Port Arthur and Dairen, 'in a country as rich as Manitoba, with coal measures not far distant and forests near by.'[1] Niuchwang or Newchwang is the treaty port near the mouth of the Liau, which, however, is greatly in need of regulation. Dairen (formerly Dalny), at first a free port established by Russia in the leased territory adjoining Port Arthur, in 1903 was placed under the Imperial Maritime Customs, but since 1905 has been under Japanese control. Besides the great iron and steel works already mentioned it has large oil-mills crushing soya and other seeds.[2]

1119. Mongolia, west of Manchuria, is a tableland occupied mainly by pastoral tribes, surrounding the desert of Gobi. Maimachin,[3] long one of the chief seats of trade between China and Russia (**1014**), lies on its northern frontier. By an agreement concluded with Russia in November 1913 what is called Outer Mongolia, that is, the districts as yet undelimited under the jurisdiction of the Chinese Amban of Urga, the Tatar general at Uliasutai, and the Chinese Amban of Kobdo, while recognised by Russia as still under the suzerainty of China, has been declared autonomous and completely withdrawn from Chinese control.

1120. Chinese or **Eastern Turkistan** occupies the basin of the Tarim, and is separated from Mongolia by part of the Chinese province of

[1] The Peking correspondent of *The Times*, in *The Times* of January 14, 1903.

[2] Many of the wharves at this port will take vessels of 25 feet draught at low-water spring tides.

[3] A Kalgan, Urga, Maimachin-Kiakhta railway has often been suggested, and with it the possible development of a frozen meat trade.

Mukden	300,000	* Dairen	50,000
Niuchwang	60,000		

Kansu. It also is a tableland with a desert in the interior, but the oases at the base of the mountains which enclose the tableland are highly cultivated. The region has been so vividly described by an observant traveller that no apology is needed for quoting his words: 'If you could get a bird's-eye view of Chinese Turkistan,' he says, 'you would see a great bare desert surrounded on three sides by barren mountains, and at their bases you would see some vivid green spots, showing out sharp and distinct like blots of green paint dropped on to a sepia picture. In the western end, round Kaskgar and Yarkand, the cultivation is of greater extent and more continuous than in the eastern half, where the oases are small and separated from each other by fifteen or twenty miles of desert. These oases are, however, extraordinarily fertile; every scrap of land that can be cultivated is used up, and every drop of water is drained off from the stream and used for irrigation.'[1] The height of the oases above sea-level is somewhat more than 4,000 feet.

Kashgar and Yarkand still maintain a caravan trade with China, and they are the centres of the trade carried on across the passes of the Pamir—a trade which was very valuable at the time when silk and other Chinese commodities were conveyed by that route to Europe (**1006**).

1121. Tibet, a lofty tableland, or series of tablelands, traversed by mountains, and bounded on the south by the Himalayas, is very scantily inhabited, and most of the inhabitants are confined to the valley of the Brahmaputra (Sanpo). Since the revolution in China the claim of the Chinese government to the allegiance of Tibet has become very shadowy. The actual ruler is the Grand Lama, the head of a peculiar form of the Buddhist religion. He resides at Lhasa, a town about 12,000 feet above sea-level. The country produces fine wool, including cashmere wool. In 1894 foreigners were allowed to advance as far as Yatung to the north of the Himalayan state of Sikkim for trade, but the trade with British India is nevertheless still small, Tibet continuing to derive the bulk of the tea it consumes in the form of brick-tea by difficult routes (**130**) from western Sechwan.

[1] Lieut. Younghusband, in *Proc. R.G.S.*, 1888, p. 498.

JAPAN

1122. Japan is an insular empire embracing all the islands off the east coast of Asia, between the Philippines in the south and the peninsula of Kamchatka in the north. It thus includes Formosa (Japanese, Taiwan) (ceded by China in 1895), the Riu-kiu (Lu-chu) or Okinawa and Bonin islands in the south, and Hokkaido (Yezo), the Kurile (Chishima) islands, and the southern half of Sakhalin, called by the Japanese Karafuto (this last ceded by Russia in 1915) in the north. But these are all to be regarded as Japanese dependencies, Japan proper being made up of the three main islands of Honshiu, Hondo or Nippon, Shikoku, and Kiushiu between $41\frac{1}{2}°$ and 31° N., in a latitude accordingly corresponding to that of the eastern part of the Mediterranean region from the south of Bulgaria to the shores of the Nile delta. It is these islands that contain the great bulk of the Japanese population, and these only which are represented in the Japanese parliament. The small isolated island of Rasa, a little to the north of the Tropic of Cancer, south of Kiushiu, and east of Formosa, is important for its phosphates. As to the Polynesian islands assigned to the Japanese since the war, see par. **1417.**

1123. The character and effects of the **climate** will be understood from what is stated in paragraphs **55, 64,** and **65** and from a consideration of two of the diagrams in the sheet introduced to illustrate the climate of New Zealand. Both Tokyo and Sapporo show the wide range of temperature characteristic even of islands in the temperate zone on the east side of the great land-masses of the northern hemisphere, even though Tokyo is on the coast. The rainfall graph for Tokyo resembles those of the Yangtse valley (**1094**) more than of northern and southern China, while Sapporo with its preponderance of winter precipitation (largely, as on the west side of the mountains generally, in the form of snow) may be compared with the south-east of India (**1047**). Both temperature and rainfall graphs are explained by the wind and rainfall maps facing page 34.

1124. The entire group is highly volcanic, containing upwards of fifty active, besides numerous extinct, volcanoes. Like other highly volcanic regions it is much subject to earthquakes, which often do immense damage.[1] **The surface is extremely irregular,** and though

[1] In consequence of one earthquake in 1891, the traffic on the main line of railway from Tokyo to Kyoto was interrupted for five months.

the passes are low relatively to the height of many of the mountains the slopes are generally steep. This has proved a hindrance in the construction of railways. Not till twenty years after the opening of the first line of railway in the country (1872) were there two lines connecting opposite sides of the main island. Tokyo and Kyoto, only 230 miles apart in a direct line, are 338 miles from one another by rail. Good roads scarcely exist. One difficulty in the way of their construction and maintenance is presented by the character of the climate and the natural drainage. During the rainy season (**64**) the copious rains that deluge the mountain slopes cause frequent destructive floods on the banks of the numerous short rivers that descend on both sides. Almost all roads are then nearly impassable; moreover, wheeled vehicles are comparatively rare. Where they do exist they are generally drawn either by men or oxen. Goods are for the most part carried on the backs of men or the small native horses. The consequence is that the cost of transport is generally high, and in many parts puts a check upon production.

1125. The **productive area** of Japan is limited by the very irregular character of the surface. Less than 30 per cent. of the surface is reckoned as productive, and about 12 per cent. (less than one-eighth) of the entire surface is devoted to agriculture; but as Japan lies, unlike the Mediterranean region, in an area of summer rains, it is enabled notwithstanding its severe winters to maintain on this relatively small area an extremely dense population.[1] All the plains and terraced mountain slopes are capable of yielding rice. By far the most densely-peopled area is that round the Bay of Ozaka, together with the strip stretching westwards along the north shore of the Inland Sea and the valley running north from Ozaka to Kyoto.

1126. Besides rice, the principal **food-crops** are wheat, barley, and soya-beans. Mulberries, from which is obtained the principal export product of the empire, silk (**338**), are planted in more than three-fourths of the provinces, everywhere in rows, allowing of space for other crops between. Tea (**391**), prepared for export as green tea, is grown chiefly between lat. 34° N. and 36° N., that is, in the south of Honshiu; and the lacquer-tree (*Rhus vernicifera*, DC.), that is, the tree that furnishes the material employed in lacquering, one of the most celebrated of old Japanese industries, is cultivated mainly in the northern part of the same island, between 37° and 39° N. Camphor (**470**), which forms one of the more important among the minor exports of Japan, is also one of the ingredients used in the art, since that substance serves as a diluent for the lacquering material. Japanese agriculture leaves little room for live stock. Horses are most numerous, and the government is doing what it can to promote the breeding of

[1] At the end of 1910 the population was equivalent to a density of about 430 per square mile in the main island, 480 to the square mile in Shikoku, and 530 to the square mile in Kiushiu.

good animals. A government bureau of horse-breeding administration was estabished an 1906. There are also government cattle farms and a government poultry plant.[1] Japan is thus altogether without, or very poorly supplied with, some important products. It has no native wool, no milk, butter, or cheese, and a comparatively small supply of leather, which has to be replaced for different purposes by various other materials (**582**).

1127. The Japanese **fisheries** for bonitos, herrings, sardines, tunnies, salmon, and a great variety of other fish, besides prawns and lobsters and cuttlefish in the home waters, as well as whales, fur-seals, &c., in more distant seas, employ a large proportion of the population and support still more. The deep-sea fisheries pursued off the shores of Korea, Formosa, Sakhalin, and the Chinese province of Kwangtung are becoming more and more important. Among the products of the fisheries refuse fish prepared as what is called fish guano is largely used as a manure.

1128. Of the **minerals** of Japan the most important is coal, the production of which is rapidly increasing. On the island of Hokkaido (Yezo) alone the area of coal is two-thirds as much as the area of coal of equal thickness in the British Isles, and a railway has been laid for the purpose of bringing the coal to the coast. Still more favourably situated are the coal-mines in the north-west of Kiushiu, near Moji, and the south-west of the same island, at and near Nagasaki. The iron ores of Japan are for the most part not easy of access, but with the view of making itself independent of foreign supplies for defensive purposes the Japanese government has spent more than two millions sterling in establishing iron and steel works at Wakamatsu on the north coast of Kiushiu, at the western entrance to the straits of Shimonoseki, within twenty miles of both coal and iron mines, but depending chiefly on the Chinese ores of Ta-yeh (**1113**), which are largely in Japanese hands. The same is true of the great iron and steel works established in Hokkaido to utilise iron sands found there. Copper and antimony are among the Japanese exports. The copper ores of Ashio or Ashiwo, near Nikko north of Tokyo, are of high grade, and are now produced in large amount. The production of silver is also important. Abundance of kaolin furnishes the raw material for the ancient and celebrated porcelain industry of the country.

1129. In all departments of Japanese industry human labour, except in the towns open to western influences (some of these new creations), is assisted only by the most primitive tools and appliances. In agriculture even the plough is rarely used. The deep and careful tillage of the ground is effected by means of the spade and other hand implements ; and where the plough is used, it is an implement that

[1] The number of horses is somewhat over a million and a half, that of cattle has never been so great. Pigs and goats are on the whole increasing in numbers, but sheep, as is natural in such a climate, are very few.

merely scratches the surface, and is incapable of making anything like a furrow. No carts are used in farming, not even the Chinese barrow. Everything is carried. A primitive hand-mill is the only apparatus used for grinding flour. Flour is, indeed, not much used. Bread was unknown till it was introduced by the Portuguese, and even yet is made only to a very limited extent in the form of cakes. All kinds of manufacturing industries were till recently almost entirely domestic, as they still are mainly, some kind of handicraft being practised in nearly every Japanese household.

1130. Great changes have, however, been brought about, as already indicated in par. **1128,** in consequence of a change in the attitude of the Japanese government towards the civilised nations of the west. The Japanese then (about 1868) began to show great eagerness to learn from western nations. European languages (especially English) were taught in their schools. Foreign teachers of science were employed in their colleges and the university of Tokyo ; Japanese students were sent to Europe and America for education. Railways and telegraphs and modern textile and other machinery were introduced. Native coalfields were developed with the aid of steam and electric power. Foreign trade was encouraged. At first this trade was limited to certain treaty ports, where alone foreigners were permitted to reside, but where they enjoyed certain privileges. The first three of these were thrown open in 1858. At last, on July 17, 1899, the whole country was thrown open to foreigners to settle in and establish industries if they pleased ; but the privileges referred to were withdrawn. Resident foreigners were required to submit themselves to the Japanese law-courts like natives, the Japanese codes of law having meantime been more or less assimilated to those of Europe. Previously, in 1889, the government had been made a constitutional limited monarchy.

1131. The first native steamship company was established in 1874. Magnificent vessels built in Japan are now seen in all waters, and since the inland navigation of Chinese rivers was thrown open to foreigners, the Japanese have been acquiring a larger and larger share of the trade.[1] Machine cotton-spinning **factories** have been established with great success, chiefly since 1882. The subsequent history of this industry is considered in par. **377.** Cotton-weaving mills have followed. In Japan, as in China, winter garments are often padded, but among the upper classes, and even among the richer tradespeople, the use of European woollen garments is coming more and more into favour, and continued efforts are being made to establish woollen manufactures with modern machinery in the country. Paper-mills

[1] The rapid growth of Japanese shipping, favoured, it may be observed, by the growing exports of Japanese coal and imports of food-stuffs and other bulky produce, as well as by Government subsidies, is shown in the shipping table in the appendix. In his annual report for 1907 the Chairman of the P. and O. Company stated that the Japanese have ousted them from the inter-colonial trade between Bombay and Japan.

of foreign type have also been set up (**588**); and a striking illustration of the power of Japan to compete with Europe in manufacturing industry has been furnished in the match trade. Japanese matches, made by machinery of foreign type, are now supplanting Swedish in China, and even in Siam and the Straits Settlements. Japanese exports of all kinds are increasing rapidly. The first locomotive built in Japan began running in 1893, and by the end of 1895 had run over 80,000 miles with perfect success. Dynamos and other electrical machinery are now among Japanese manufactures, and such machinery is now being more and more used in the application of the extensive water powers of the country.[1] Modern machinery is now very largely manufactured in Japan even for export. It is significant that among the most rapidly growing imports are sugar, flour, beans, peas and other articles of consumption, besides woollens. Japanese industry is still hampered by lack of capital, but this has largely been made good through the profits of the war,[2] which has converted Japan, like the United States, from a debtor into a creditor nation. This is one of the changes referred to in par. **30** as possibly permanent. Wages have also risen considerably,[3] and though prices of commodities have generally also risen they had not risen before the war in the same proportion.

[1] In 1911 the water-power developed in Japan, mainly by turbines, was equivalent to 103,532 horse power as compared with 12,215 in 1905.

[2] Capital issues in 1916, 1,101 million yen; in 1920, when the value of the yen in terms of British currency was high, 6,671 millions.

[3] In making such comparisons the changes in the value of money have to be taken into account. Till October 1, 1897, the standard currency of Japan was a silver yen; since that date it is a yen on a gold basis divided into 100 sen. The gold yen is equal to 2*s.* 0½*d.* (roughly 10 to 1*l.*). In 1885 the average value of the yen was about 75 per cent. greater than it is now. In that year the average daily wage of a male weaver in Japan was 0·125 yen = at the present value of the yen 0·219 yen, in 1899 the wage was 0·411 yen; in 1885 the wage of a joiner was 0·226 yen = at present values 0·395 yen, in 1899 it was 0·568 yen. There was an arrest in the rise of wages in the years 1904–06 which covered the period of the war with Russia, but since the latter date it has gone on with renewed rapidity. The year 1900 serving as base when wages in all trades were represented as 100, the index number of the wages of a male weaver and of a carpenter were in 1887 56 or less, but both rose to above 148 in 1910, and that of a day labourer's wages to 143. Meantime the index number for rice had risen to only 114, wheat to 136, soya beans to 119; brown foreign sugar to 134, but white to 185 (*Financial Annals of Japan*). As in most other parts of the world the war seems to have told adversely on the working classes. Wages, says the British 'Report on Japanese Labour' issued in 1920 [Cd. 511], 'have nearly doubled,' but adds figures showing that the cost of his staple food, rice, had increased by March 1919 by 150 per cent., and that rents had also more than doubled, and adds that clothing and sundries had gone up similarly. Even at the higher rates Japanese labour remains low priced. Complaints are made, as in India and China, of its low standard of efficiency, but how much of this is due to the labourer himself, how much to defects in capital equipment and in organization, involving at present excessive hours of work (in factories generally 11 hours per shift), it is difficult to estimate. In any case much of the success of Japan in competition with other countries is due to the fact that wages are still low in proportion to efficiency. Since 1916 Japan has had a Factory Act, but it comes into operation only gradually, and will not take full effect till 1931, by which date work in factories will be prohibited between 10 P.M. and 4 A.M.

1132. The nature of the change in Japanese commerce in the twenty years before the war can be seen from the tables in the Appendix. The only point on which remark need be made is the decline in the import of sugar which is due to the development of the sugar industry in Formosa and the duties imposed in the interest of that industry in 1901 (**1135**).

1133. Nearly all the **chief towns** of Japan are seaports. Tokyo, the present capital, is, however, accessible only to ships of small size, and its port is Yokohama,[1] which has a safe harbour for vessels of any size. Great harbour works begun in 1889 are intended to provide a harbour with a depth of 35 feet alongside the pier. Twelve miles south of Yokohama is the government dockyard of Yokosuka. Ozaka, the largest town in southern Japan and the chief seat of the cotton-spinning industry, which is here favoured by the abundance of labour and the extent of the local market, suffers from the same drawback as Tokyo, but Kobe or Hyogo, eighteen miles distant on the same bay, has an excellent harbour.[2] Kyoto, the old capital of Japan, lies inland about twenty-five miles from Ozaka and seven miles from Lake Biwa. Nagoya, at the head of the Owari Bay to the east, is an important manufacturing and commercial town noted for its porcelain and other artistic products, but is not accessible to sea-going ships owing to the silting up of the upper part of the bay. Nagasaki, on the other hand, on the south-east coast of the island of Kiushiu, has an excellent harbour, and is now much frequented as a coaling station and has a large export of coal. It has large graving docks, a patent slip, and a shipbuilding yard with the most improved appliances capable of building two vessels 600 feet long and two 300 feet long at one time, machine-shops, boiler-works and foundries, and a technical training-school in connection with these establishments. Deshima, an artificial islet close to Nagasaki, was the seat of a Dutch factory or trading-station as far back as 1641. On the Inland Sea in the south of the main island near Hiroshima is the naval arsenal of Kure. Niigata, the principal port on the west coast, has its shipping stopped for half the year by the strong surf that beats along the whole of this flat and dangerous coast during the prevalence of the winter monsoon.

1134. Hakodate, on Tsugaru Strait, in Hokkaido, has only a small foreign trade. This large island, though said to have 25 per cent. of

[1] The European consuls reside at the neighbouring town of Kanagawa.

[2] The water alongside the piers has been dredged to a depth of 36 feet, and the harbour is now (1921) being enlarged so as to enclose an area of nearly two square miles. In the same year the Kawasaki Dockyard Co., at Kobe, was constructing, besides cargo boats, a 45,000 ton battleship.

Tokyo . . .	2,200,000	Nagasaki . . .	200,000
Ozaka . . .	1,250,000	Kure	150,000
Kyoto . . .	600,000	Hakodate . . .	150,000
Nagoya . . .	450,000	Yokosuka . . .	100,000
Yokohama . .	425,000		

its surface fit for agriculture, has a severe climate, and at present has only a scanty population on the coast, chiefly engaged in fishing, though there is now, as already intimated, also a mining population.

1135. Formosa, or Taiwan, is traversed from north to south by a range of mountains which, along with the eastern plain, are inhabited by a semi-barbarous people. The inhabitants of the western plain are mainly of Chinese origin, but not of a high type. Tea and camphor, the latter a government monopoly, are largely exported, and since the island became Japanese, much attention has been given to the cultivation of sugar.[1] The island is the chief source of the Japanese camphor and is estimated to furnish three-fourths of the world's supply. The capital is Taipei, near the northern end, connected by rail with the port of Kilung or Kelung, which has an excellent anchorage, and near which are mines of good soft coal capable of being mixed with Welsh coal for use on steamers. Improvements are projected on the harbours of Anping and Takau on the west coast to promote the sugar industry, which is carried on in the neighbourhood.

1136. Korea, or Chosen, as it is called by the Japanese, the mountainous peninsula between the Yellow Sea and the Sea of Japan, like Tibet was formerly a loose dependency of China, but in 1895, after a war between China and Japan, was declared independent, but was never really so. From 1905 it has been practically under the control of Japan, which annexed it in 1910. Of the Korean ports opened to foreign commerce, the most important are Chemulpho on the west coast, Wiju, further north on the Yalu, Ping-yang (or Phyong-yang) on the Tai-dong River in about lat. 39° N., Fusan [2] on the south-east, and Wönsan, or Yuensan, on Broughton Bay on the east coast. Chemulpho is the port of the capital, Seoul, or Hanyang, with which it is connected by rail. Seoul is now lit by electricity and provided with electric tramways. Several other treaty ports are now opened, and trade is rapidly increasing. Ginseng, a drug highly valued by the Chinese, is exported as a monopoly of the crown. The chief exports are, however, gold, beans, and rice. The production of raw cotton is increasing, and seems likely to increase still more rapidly. The cultivation of flax has been introduced. Gold and coal, including anthracite, are mined. The chief imports are cotton piece-goods from England, America, and Japan, and cotton yarns mainly from Japan.

[1] The production of sugar in the island increased from 47,000 tons in 1901-2 to 341,000 tons in 1917–18. The import of sugar into Japan proper sank from about 300,000 tons in 1901 to about 80,000 in 1911, and though there was a rise in 1912 when the Formosa yield was greatly reduced by disastrous typhoons, it has always been less than half the amount of 1901 since 1908.

[2] Great harbour works are now in progress at Fusan, which since 1905 has been connected with Seoul by rail.

AFRICA

1137. This continent, though not the least populous either in respect of the absolute number of the estimated population or the average density, is that which is of least importance as regards its contribution to external commerce. This is due partly to natural unproductiveness, which does not favour density of population over any large area; partly to the backward state of civilisation; and in particular to the fact that throughout a large part of the interior population and production are kept down by misgovernment, internal wars, and, above all, the practice of slavery; partly to the fact that in no other continent have European influences, and especially European modes of production and transport, made so little headway.

1138. The natural unproductiveness of the continent is in a large measure attributable to the want of rain. Africa lies as a whole in latitudes where the atmosphere is always able to retain large quantities of vapour uncondensed. Its surface, like that of Spain, is made up mainly of plateaux with bordering mountains, so that the interior is in most parts reached only by winds that have been deprived of the greater portion of their moisture. The only regions with fairly abundant rainfall are certain parts of the equatorial region, narrow strips on the east and south-east coast, and part of the north coast in the neighbourhood of the Atlas Mountains. There are vast regions in the north and the south-west entirely desert, or nearly so, except where capable of irrigation. The only district possessing a really high density of population is a small part of Egypt, in the north-east.

COUNTRIES AND REGIONS OF AFRICA

1139. EGYPT. This country[1] extends from the mouths of the Nile to Wady Halfa, in about lat. 22° N. In the east it extends to the Red Sea, and includes the peninsula of Sinai; and in the west the boundary is an indefinite line passing through the great Libyan desert. The **habitable area,** however, is almost confined to the tract capable of being irrigated by the waters of the Nile—that is, to the Nile delta, and a valley, varying from two to fifteen miles in width, lying between deserts on both banks of the Nile. Hence, though the distance in a direct line from Wady Halfa to the shore of the Mediterranean is about 680 miles, equal to the distance from the Scilly Isles to the northern extremity of the Shetland Islands, the entire area fit for cultivation is less than 10,000 square miles,[2] or about one-half larger than Yorkshire; and on this area is crowded a population of above 12,500,000, almost wholly dependent on agriculture.

1140. What renders this highly-productive agriculture possible is the regular **annual rise of the Nile**—a rise now known to be due to the summer (monsoon) rains (**64–5**) on the Abyssinian mountains. The river begins to rise about the 26th of June. It grows turbid and red with the fertilising mud which it carries in suspension. By the month of September it has reached the top of its banks and begins to overflow, except where restrained by artificial dykes. A normal rise at Cairo is about 25 feet; if the rise exceeds 27 feet there is danger to the embankments, and day and night these are watched by the able-bodied male population, ready to fortify or heighten them under the direction of engineers. The labour required for the maintenance of the irrigation works was formerly exacted from the people by the government. As the temperatures even in the delta are favourable to growth all the year round, the mean monthly temperatures at Cairo rising steadily from 54° F. in January to 85° F. in July and then declining with equal steadiness, moisture is the only further requirement for cultivation, but to this the local rainfall—at Cairo

[1] The political relations of this country are still undefined. During the war the country was declared a British protectorate, but according to an official report drawn up by Lord Milner it was not annexed to the British Empire. The British government has promised to give up the protectorate at no distant date, and meantime (1921) the position of Egypt with respect to the United Kingdom is subject of negotiation.

[2] In 1911, the entire cultivated area was 9,173 square miles. The settled area, including rivers, canals, roads, &c., is about 13,000 square miles.

on the average only $1\frac{1}{2}$ inches annually—contributes hardly anything.

1141. In Upper Egypt, that is, from the southern frontier to Asiut, in about 27° N., the sole method of irrigation practised till supplies of water were made available in summer by the Aswan dam was the old method of the Pharaohs, the method described by Shakespeare in the words which he puts into the mouth of Mark Antony—

> They take the flow o' the Nile
> By certain scales i' the pyramid; they know,
> By the height, the lowness, or the mean, if dearth,
> Or foison, follow. The higher Nilus swells,
> The more it promises: as it ebbs, the seedsman
> Upon the slime and ooze scatters his grain,
> And shortly comes the harvest.

The scales or gauge by which the rise and fall of the river are measured are not, it is true, in the Pyramids, but otherwise this description is as accurate as it is graphic, and it is only necessary to add that the country on both banks was divided up into basins by embankments reaching to the hills on both sides, that these basins were gradually filled through canals and sluices, and then emptied at the end of a period of seventy days or so. By this method of irrigation the soil was condemned to sterility for half the year, during which it was either under water or baked to a degree of hardness which made it impossible to grow anything. By it, too, only such crops could be grown as ripen within a short period—beans, lupines, clover, lentils, wheat, barley, onions.

1142. Of the crops just mentioned the first four, but above all clover, in the Egyptian variety known as *bersim*, are important as enriching the soil with nitrogen, but additional nitrogenous manures are required, and, while some of these are imported, Egypt itself is fortunate in possessing on both banks of the Nile between Keneh and Aswan, deposits of nitrates known as *tafla* in sufficient quantity to be worth the cost of carriage in the Nile valley, though not to enter into world commerce. What is said to be the richest phosphate field in the world has been discovered on Sofaja Bay, in 26° 40′ N. (**90, 91**).

1143. The more valuable crops, cotton, sugar-cane, maize, millet, dates, rice, &c., require higher temperatures, and some of them a longer period to mature, and hence in Egypt demand a system of perennial irrigation—that is, a system by which water can be supplied all the year round. On a small scale this has been done within the town enclosures on the banks of the Nile and its deltaic arms from ancient times downwards by means of apparatus for raising water from the river; but on a large scale it can be done only with the aid of perennial canals. This system, in which high embankments are erected to confine the river in flood, and high-banked canals to conduct the water to the irrigable basins, has been practised on a large scale only since the first half of the nineteenth century, and was at first

confined to the delta, but is gradually being extended further up as the means for supplying the necessary irrigation water are provided. The importance of perennial irrigation in Egypt will be appreciated from the following example of what was a few years ago a typical deltaic three years' rotation. Cotton is grown from March to the end of October, and is immediately followed by clover, of which seven cuts are taken. In the next eighteen months from July onwards two crops of maize and one of wheat may be reaped, the wheat being grown in the winter and spring. The second crop of maize may be succeeded by clover, of which two cuts can be obtained before the ground is cleared once more at the beginning of March for cotton. The importance of this system of irrigation is enhanced by the fact that some of the summer crops of Egypt are of exceptionally high value. Compare, however, par. **1147.**

1144. Besides the land immediately adjoining the river, Middle Egypt, that is, the part below Asiut, includes in its productive area a detached district known as the Fayum, which lies to the west, a little above the head of the delta. For three thousand years this district has been fed with water by the Bahr Yusuf, a channel led from the Nile a little above Asiut. The Bahr Yusuf[1] is 270 miles in length, and is also employed in irrigating the basins along its route. In the course of the nineteenth century another canal, called the Ibrahimiye Canal, starting at Asiut, was constructed for the irrigation of Middle Egypt, and it is from the upper part of this canal that the Bahr Yusuf is now directly supplied.

1145. The full supply of water obtainable from a normal rise of the Nile is required for the area of land already under cultivation in Egypt, and famine is threatened to a greater or less extent both when the rise is exceptionally low, and when it is so high as to overtop the artificial embankments and thus destroy the crops growing under their protection. The regulation of the river thus requires the constant attention of the government. At the head of the delta there exist vast works to control the level of the river, and since the government of the country has been under British influence (since 1883) these works have been greatly improved. Anglo-Indian irrigation engineers succeeded in rendering efficient what is known as the barrage, a pair of dams with sluices on the two main arms of the Nile delta a little below Cairo, and thereby the whole of the delta and the part of Egypt to the north-east of Cairo and the south of Zagazig have been made independent of the state of the Nile. In Upper and Middle Egypt also the system of basin irrigation has been improved by arrangements allowing of the water in basins belonging to a group in one part of the Nile valley being supplemented in a low flood by canals led from the next group higher up. Of the result of such improvements the most

[1] River of Joseph. Its construction is popularly attributed to Joseph the Israelite.

striking indication perhaps is that afforded by the increase of population.[1]

1146. The figures just given will enable one also to appreciate the importance of the great dam at Aswan (Assuan), opened in December 1902, and the subsidiary dam lower down at Asiut. Between November and April the sluices of the Aswan dam are closed to such an extent as to allow of the accumulation of the Nile water above, in the form of a lake reaching about two hundred miles up. At the beginning of May 1,065 million cubic metres of water were thus rendered available for irrigation, and by the year 1910 all Lower Egypt, all Middle Egypt, including the Fayum, and parts of Upper Egypt were irrigated on the perennial system. The Asiut dam is to supply water to the Ibrahimiye Canal in spring and summer. In March 1903 another dam was opened at Zifte on the Damietta arm of the Nile about midway between Cairo and the sea, and in February 1909 another at Esneh about 100 miles north of Aswan. In December 1912 a still further supply of water was obtained by raising the height of the Aswan dam by six metres, or about twenty feet. This, it is estimated, will serve to bring an additional area of about a million acres (1,560 square miles) under cultivation in the delta, and to extend perennial irrigation ultimately over the whole of Upper Egypt.

1147. This conversion from basin to perennial irrigation has not been without certain drawbacks. The most obvious disadvantage is the loss of the fertilising silt which was left on the land after the annual flooding. This silt is now deposited in the river bed and the distributing canals, and increased labour is involved in removing these deposits, which are piled up on the banks. As a remedy or a partial remedy for this evil it has been suggested that when the additional water-supply to be formed by the raising of the Aswan dam is available, the basin system should not be completely abandoned, but that each basin should be divided into two, and each half-basin should receive inundation water with its attendant silt in alternate years. There might be an advantage in this as long as full use cannot be made of the additional water-supply, but if there is an advantage on the whole in replacing basin by perennial irrigation in the long run the more extensively that is done the better. In any case perennial irrigation renders necessary a greatly increased use of manures. Another disadvantage ascribed to the present use of the increased water-supply is in connection with the increased cotton cultivation. The rapidly

[1] A census taken in May 1882 returned a population of 6,817,000, that of June 1897 one of 9,734,000, showing an increase at the average rate of 2·4 per cent. per annum—a rate unparalleled in any other old country whether agricultural or manufacturing. The population in June 1907, exclusive of Beduin nomads, was 11,190,000, showing a mean rate of increase in the ten years of 1·40 per cent. per annum; that of March 1917, 12,566,000, giving a mean annual increase of 1·17 per cent.

Asiut . . . 50,000

growing demand for the valuable Egyptian cotton has caused a greatly increased area to be devoted to the crop. In 1895 the area under cotton in Egypt was just about one million acres, in 1911 it had increased to more than one and three-quarter million acres. The yield per acre had, however, greatly diminished. Down to 1902 the average yield per acre was always above 500 lbs. of raw cotton, since 1902 it has never reached that amount, and has sometimes been much less. This diminished yield has not indeed all to be put down to a lowered productiveness of the soil. Much of it is simply the result of bringing poorer land under cultivation, which inevitably brings down the average. But there is ample evidence too of diminished fertility of the soil, and while this has been shown to be partly due to deterioration in the methods of cultivation with the view of getting as great a profit as possible out of this remunerative crop, the substitution of a two-year rotation for cotton in place of the three-year rotation described in par. **1143,** and the growing of the cotton plants too close, partly due also to increasing ravages of the cotton-worm and the boll-worm, there is reason for believing that it is in large part due to the raising of the level of the underground water-supply, in consequence of the higher level of the water in the canals in summer, and more particularly to the sudden raising of that level by the too free use of irrigation water in July, submerging the deeper roots which had reached uninjured a greater depth when the soil was drier. This possibly is also a large part of the explanation of the deterioration of the quality of Egyptian cotton, which has also been observed in recent years. With a view to remedy this evil great drainage works have been begun in the middle and northern part of the delta. Altogether it is estimated that about 2,400 square miles of salt land may ultimately be reclaimed on the seaboard margin of the delta.

1148. The Nile, besides being the great means of irrigation, is of importance as **a waterway.** It is navigable without impediment as far as the Aswan dam, where a lock allows of vessels ascending to the 'second cataract' at Wady Halfa. At high water this rapid can be navigated easily enough, but higher up there are many other obstructions to navigation. From the western of the two chief arms of the Nile in the delta a navigable canal, the Mahmudieh Canal, about ten feet in depth, proceeds to Alexandria; and another canal proceeds eastwards from the important town of Zagazig, on one of the minor arms of the delta, to the Suez Canal, and sends a branch southwards from Ismailia to Suez. It is likewise joined by a canal from Cairo. The Suez Canal lies entirely in Egyptian territory. The main **railways** of Egypt are unfortunately on two gauges, as shown on the map inserted between the next two pages. There are also numerous light agricultural railways on narrower gauges (not shown on the map). Arrangements are now (1921) being made to allow of aeroplanes flying regularly across the desert between Cairo and Baghdad.

1149. The nature of Egyptian **commerce** is shown in the tables in the Appendix. It will be noticed that no minerals are mentioned among the exports, but manganese iron ore is produced in considerable quantity, and petroleum occurs on the west shore of the Red Sea opposite or nearly opposite the south end of the Sinai Peninsula. Other minerals include gold, carbonate and sulphate of soda, as well as the nitrates and phosphates mentioned in par. **1142.** The bulk of foreign commerce is concentrated at Alexandria, the ancient port at the north-western extremity of the delta. Port Said, at the northern end of the Suez Canal, is a great coaling-station, and has a large *entrepôt* trade in eastern commodities. Minor ports are Rosetta and Damietta, near the mouths of the arms of the Nile which take their names from these towns. Bars obstruct the mouth of the river at both these places. The capital is Cairo, at the head of the delta. Its suburb of Bulak is a busy river-port.

1150. In the desert belonging to Egypt, west of the Nile, there are several **oases,** each with a few thousand inhabitants. The most important are Siwah (ancient Jupiter Ammon), to the south of the Libyan plateau in the latitude of Fayum, and Khargeh, in about 25½° N., which was connected by rail with the Nile valley in 1908.

1151. Reference has already been made (**1034**) to **Egypt as a transit land** in the lucrative trade carried on between the shores of the Indian Ocean and the Mediterranean. The frankincense of Hadramut passed this way at a very remote date, and so also did ivory, precious stones, spices, and other valuable commodities from tropical Africa and the far east. Different routes were used for reaching the Nile valley, but one seems to have been much frequented in many periods of history and even in prehistoric times. It is that which connects the modern port of Kosseir on the Red Sea with Koft, the ancient *Koptos*, situated on that part of the Nile where the river approaches nearer to the sea than anywhere else in Upper Egypt. A trough sunk in the desert, though at an elevation much above that of the Nile valley, connects the two places, and has favoured the sinking of wells. It is believed by Mr. Wallis Budge that it was probably by this route that the people who founded the oldest known civilisation of Egypt entered the country. The port of Kosseir was known to the ancient Greeks as *Leukos Limen*, afterwards translated by the Romans into *Albus Portus* (white harbour). By many scholars this port is believed to have been the *Myos Hormos*, from which in the days of the Roman Empire the Indian fleets regularly set sail at the time of the summer solstice.

1152. Since the re-conquest of the Egyptian Sudan by British and Egyptian forces in 1896–99 the whole of the Nile region as far as Uganda has been regarded as a joint dominion of England and Egypt. The northern part of this region is entirely dependent on irrigation.

Cairo	800,000	Port Said . . .	90,000
Alexandria . . .	450,000		

AFRICA - RAILWAY MAP

The Edinburgh Geographical Institute

John Bartholomew & Son Ltd.

Longmans, Green & Co., London, New York, Bombay, Calcutta & Madras.

Occasional rains occur in thunderstorms about the confluence of the Blue and White Nile, and higher up the rains become more prolonged and abundant as one goes to the south. To the south of 10° N., in the region traversed by the White Nile and the Bahr-el-Ghazal with its numerous tributaries, plentiful summer rains convert the low plains bordering these rivers into extensive swamps, and form a great lake known as Lake No at the confluence of the two main streams. The low plains adjoining the rivers are very unhealthy, but healthier tracts at a higher elevation intervene. At present almost the only commercial products of this region are ivory and rubber, but there are vast areas capable of producing cotton, oil-seeds, indigo, and other tropical products, the chief impediments to the commercial production of which are the defective means of communication and the lack of labour. The navigation of the Nile in the Egyptian Sudan is impeded by four cataracts, or series of cataracts, between the northern frontier and Khartum, and above Khartum it is liable to be interrupted by accumulations of matted vegetable matter known as *sudd*. A navigable channel has, however, been cleared through the sudd to Uganda, in which the Nile is navigable to Fort Berkeley in about 4° 40′ N., a little above Lado. The Bahr-el-Ghazal and its tributary the Bahr-el-Arab are navigable to Meshra-er-Rek in about 8° 20′ N. Khartum, the capital of the province, situated at the confluence of the White and Blue Niles, has since the end of 1899 been connected by rail with Wady Halfa, but further railways are required for the development of the resources of the region.[1] Khartum, which was captured from the Mahdi along with the adjoining town of Omdurman on the left bank of the White Nile in 1898, is being rebuilt as a European city. Soon after its capture a college, known as the Gordon College, was founded here to be the means of introducing western science among the people. The chief product found on its market is gum from Kordofan.

1153. The cultivation of cotton is gradually but at present slowly extending in the Egyptian Sudan, and it is hoped that this territory will ultimately yield in large quantity varieties of cotton approaching that of Egypt in quality. There are two obstacles to this expansion. One is the lack of labour. Since the re-establishment of order in this territory the natives with few wants live in easy-going abundance. But this want will gradually be met by the increase of the population. Cultivation by the natives of millets, maize, sesame, ground-nuts, and cotton is rapidly extending.[2] A more serious obstacle is the lack of an adequate water supply, which has to be furnished in such a way as not to interfere with the requirements of Egypt. The local conditions, however, appear to allow of this on a very large scale. The

[1] See the railway map of Africa.

[2] The area under tillage increased from 529,000 acres in 1904 to 1,427,000 in 1911, about 80 per cent. of this area being unirrigated. In the ten years 1901–1911 the cotton export of the Sudan increased from 2·65 to 27·34 million lbs.

Jezire or wedge-shaped tract between the Blue and White Nile is a remarkably level area with a gentle slope towards the west and north-west, almost ideal for irrigation, and by damming the White Nile at or a little above Khartum it is considered that enough water could be stored above that dam to make good the loss of water which would have to be taken from the Blue Nile to irrigate this area, or a portion of it, while at the same time the Khartum dam would tend to bring under control the flood supplies of September–November, and would bring large tracts of Kordofan on the left bank of the Nile under flood cultivation.[1] To supply the irrigation water for the Jezire, a dam would be constructed on the Blue Nile at Sennar.

1154. WESTERN MEDITERRANEAN STATES.—A. The vast area, mainly desert, between Egypt and Tunis, previously the Turkish province of Tripoli, has since 1912 formed the Italian dependency of **Libia italiana.** It includes, besides Tripolitania in the west, the oases of Fezzan (the chief of which is Murzuk), to the south, and the plateau of Barka or Cirenaica, with a small strip of cultivable land east of the Gulf of Sidra. The navigation along the coast (700 or 800 miles in length) is dangerous on account of the numerous sandbanks and the want of harbours. Tripoli is the only seaport of consequence, and is the centre of a caravan trade across the Sahara. Its only important exports of local origin are alfa or esparto grass and sponges (**493**). The date palm grows wherever there is water within reach of its roots, and in the oases is noted for the quality of its fruit. Mediterranean fruits of all kinds also flourish, especially in the vicinity of the higher grounds near the coast. A small trade is carried on at Bengazi, the port of Cirenaica. Ostrich feathers are an important article in the caravan trade, and under the shelter of Italian rule the rearing of ostriches is not unlikely to become an important industry.

1155. B.—Algeria and Tunis. The former has been a French colony since 1830, the latter a French protectorate since 1881. Both are traversed by parallel chains of the Great and Little Atlas, but the principal cultivated area has a different relation to these mountains in the two dependencies. In Algeria the region best fitted for cultivation is a strip of lowland, or land at moderate elevation, between the coast and the Little Atlas, a strip known as the Tell; and the region between the Great and Little Atlas is a plateau producing little besides alfa grass. In Tunis the chief area of cultivation is a valley between the two chains of the Atlas, namely, the valley of the Mejerda, a river which regularly overflows its banks during the winter rains (**66**), irrigating and fertilising the neighbouring plains. The climate and products of both Algeria and Tunis are similar to those of southern Italy and southern Spain. In both wine is a product of growing

[1] In 1912 it was decided to proceed with works of this nature, which, it is estimated, would in the course of ten to fifteen years irrigate a tract of 500,000 acres, or 780 square miles.

importance and great promise (**295, 298**). As to the olive groves of Sfax, see par. **454.**

1156. Since the occupation of Algeria by France, repeated efforts have been made to increase the French element in the population by the planting of colonies. Land confiscated from the native Arabs and Berbers (Kabyles) has been granted to the colonists on varying terms, and villages have been erected for them in many parts of the country. The results have not been altogether satisfactory. The French form only a small proportion of the population, and are out-numbered by Europeans of other origin (Spaniards, Italians, and Maltese). French rule has, however, done much for the development of the resources of the colony, though at a considerable annual cost to the mother country. Thousands of miles of excellent roads and many hundreds of miles of railways have been made. Harbours have been constructed. New land has been brought under cultivation by the sinking of artesian wells (**98**). The region south of the Atlas, the Biled-ul-jerid, or Land of Dates, is largely occupied by nomadic Arabs; but here, also, date-planting has been greatly increased by artesian wells, as on the Wed Rhir between Biskra and Tugurt. Far to the south the oases of Wargla and Golea also belong to Algeria.

1157. The rising exports of Algeria are iron ore, wine, wool, early potatoes (which now cover about a third of the cultivated area, and are nearly all exported to France), grapes and other fruit, tobacco, and olive oil. In the exports to the United Kingdom from both Algeria and Tunis alfa grass takes the first place; but the trade in this article has been considerably affected by the increasing use of wood-pulp in paper-making. The minerals already of commercial importance are iron and zinc ores and phosphate rock, the two latter derived from Tunis. The iron ores are obtained from numerous mines both in Algeria and Tunis and are exported from the ports of Oran, Tenes, Algiers, Bougie, Bona, and Tunis. At present the most productive deposit is that of Benisaf in western Algeria, but the most promising for the future are those of Ouenza, near the eastern frontier, south by east of Bona, with which it is to be connected by a railway 137 miles long.[1] These ores have only slight traces of phosphorus. Philippeville in the east is the port of Constantine. In Tunis the forests on the hill slopes north of the Mejerda are rich in cork-oaks, and another species of oak which has a valuable tanning bark. They hence promise to be of increasing commercial value. At present the leading exports from Tunis are olive oil and cereals (wheat and

[1] The estimates of the total quantity of ore in these deposits vary, according to the *Iron Resources of the World*, from 40,000,000 to 70,000,000 tons. It is expected that the annual production of the Ouenza and neighbouring mines will be about 4,000,000 tons.

Algiers (Alger)	200,000	Oran	125,000
Tunis	170,000	Constantine	65,000

barley). The bulk of the Algerian exports go to France, those of Tunis to Italy. The United Kingdom supplies a large proportion (in the case of Tunis the largest proportion) of the manufactured goods which form the chief articles of import into both regions.[1]

1158. Most of the ports of Tunis are only open roadsteads. The town of Tunis, the most populous town either in the protectorate of Tunis or Algeria, and the chief seat of the foreign commerce of the protectorate, is situated at the end of a very shallow lagoon, and vessels formerly had to load and discharge in the roadstead of Goletta, at the narrow mouth of this lagoon, but a canal through the lagoon 21 feet in depth now allows large vessels to reach the town. Susa, Sfax, and Cabes or Gabes, on the east coast, are the ports chiefly frequented in the commerce with the interior of Africa, inasmuch as caravans that ascend the valley of the Mejerda are obstructed on their way southwards by the shotts, or string of shallow salt lakes, that extend for about two hundred and fifty miles inland, to the south of the mountains. These shotts lie below the level of the Mediterranean. It has been proposed to let in the waters of that sea to cover the depression which they occupy; but the project has been abandoned as unlikely to prove remunerative. On the north coast, a strong naval station has been formed by the French at Bizerta at the narrow mouth of a lagoon.

1159. C.—Morocco is a Mohammedan empire in the north-west of Africa, but since 1912 has acknowledged the protection of France, which is virtually dominant in the greater part of the country. Under a treaty concluded between France and Spain in the same year a zone in the north, with an average width of 60 miles, but excluding Tangier, was recognized as under Spanish control. Morocco includes, as a loose dependency, the oases of Tuat in the south-east, which are separated by one hundred miles of desert from the nearest cultivable parts of Morocco proper. The surface of Morocco proper is highly mountainous. The High Atlas traverse the country from south-west to north-east, and are connected at the north-eastern extremity with a coast range known as Er Rif. The chief permanent rivers of the country flow through the lowlands and plains in the angle between these ranges, and in that area lie also the chief towns—Marakesh (the present capital) in the south, and Fez and Mekinez or Meknes in the north. All of these lie at the base of the mountains, the western plains being extremely arid. South of the Atlas, the rivers, such as the Wady Draa, are temporary, containing water in their lower courses only when the snow is melting on the mountains.

[1] After the establishment of a preferential tariff in favour of French goods in 1898, the value of British exports to Tunis at first declined, but they afterwards recovered. The principal British exports to Tunis before the war were cottons and coal; among those to Algeria coal is by far the most important, machinery coming next.

Fez	110,000	Marakesh . . .	105,000

1160. In relation to foreign commerce Morocco can be described as little more than a country of possibilities. The government, till recently one of the most fanatical in the world, regarded all Christian nations with aversion, and even disdain, and these feelings are still cherished by the great body of the people. Foreign commerce consequently was in no way encouraged, and the export even of some of the most valuable commodities (such as esparto grass) was kept down by high export duties. There were no railways, no wheeled carts, no internal navigation. All goods had to be carried on the backs of animals, chiefly camels. Only two tolerable ports were opened to European trade—Tangier, on the Strait of Gibraltar, and Mogador, the port of Morocco, in the south.

1161. Great changes have, however, been brought about since the date of European intervention. Large areas have a luxuriantly fertile soil, and the rivers in many places are well adapted for irrigation. These advantages are now being turned to account, and multitudes of farms have been sold at a cheap rate to European colonists, who are developing agriculture by modern methods. The fisheries (tunny, sardines, lobster, &c.) are being actively prosecuted, chiefly by French fishermen. Iron ores mined in the Rif are now being exported from Melilla in the Spanish zone. Many hundreds of roads suitable for motor cars have been built, and narrow gauge railways now connect points on the coast with the chief towns of the interior. Many mills of European type for treatment of the raw materials of the country have been erected, and water-powers are being turned to account by electricity. In French Morocco great attention is being given to the development of the port of Casablanca, which is already connected by rail both with Fez (by way of Rabat) to the north-east, and Marakesh to the south-east. Among the minor ports, Rabat has a good river harbour, but obstructed by a bar; Saffi, only an open roadstead. The harbour of Tetuan, on a river entering the Mediterranean, requires to be cleared of sand.

1162. The foreign commerce is at present characteristic of a developing country—the imports more than twice the value of the exports, betokening an excess of investment. It is chiefly with France and the United Kingdom. The chief exports are eggs, wheat and other grains, almonds, wool, linseed, and other agricultural products; but some native manufactures, such as fez caps and leather, are exported to various parts of north Africa.

1163. BRITISH SOUTH AFRICA. British territory now extends from the south coast to Lakes Nyasa and Tanganyika, but with an intervening Portuguese wedge on the lower Zambezi. It thus includes, besides the Union of South Africa, a state formed in 1910 by the union of the former self-governing colonies of the Cape of Good Hope,

Casablanca . . . 90,000

Natal, the Orange Free State, and the Transvaal, which now form provinces of the Union with self-government in local affairs, the Bechuanaland Protectorate, Basutoland, the vast territory of Rhodesia, the Nyasaland Protectorate, and, since 1915, the Protectorate of South-West Africa (formerly German South-West Africa).[1] The seat of the legislature of the Union of South Africa is Cape Town, that of the executive government Pretoria.

1164. Of this area the part to the south of the Zambezi has so much in common in the character of the physical features and the climate and the circumstances determining the economic development, that it will be convenient to take a preliminary general view of that portion, apart from the area to the north of the Zambezi, even though that river divides the territory of the British South Africa Company.

1165. Throughout British South Africa the rise of the **surface** from the coast to considerable altitudes in the interior is rapid. From the western half of the south coast the ascent is made in well-marked terraces, the innermost of which form tablelands of 3,000 feet or more in height. These tablelands are known by the Hottentot name of Karroos. The Great Karroo, which has a length of nearly three hundred miles from west to east and a width in many parts of seventy miles, lies between the Nieuweld Mountains and the Sneeuwbergen (Snow Mountains) in the north and the Zwartebergen (Black Mountains) and Outeniqua Mountains in the south. Its altitude gradually varies from under 2,000 feet in the west to above 2,500 feet in the east. To the south of it, in the west, lies the Little Karroo, which is drained from the west and east by the two headwaters of the Gouritz River, which finally escapes southwards through a notch (in Dutch *kloof*) in the Langebergen (Long Mountains).

1166. On the eastern side the rise in terraces is not so well marked, or at least not so regular. Here the main feature is the Drakenberg[2] (Dragon Mountain) Range, which may be said to begin in the south in the Stormbergen (Storm Mountains) to the north-east of the

[1] In 1903 a convention representing all the territories of British S. Africa agreed to adopt a uniform customs tariff, with a preference in favour of commodities grown, produced, or manufactured in the United Kingdom in the case of all goods on which duties were imposed at an *ad valorem* rate, such goods including the most important British imports. On certain classes of goods a rebate of 25 per cent. on those of British origin is allowed; and on goods liable to an *ad valorem* duty of 2½ per cent., in the case of British imports the duty is wholly remitted.

These privileges were also extended to British Colonies prepared to offer similar advantages in return. This tariff was considerably modified by another Conference held in 1906 and later by Acts of Legislation of the Union of South Africa. Minor amendments were made in 1918 having as their object the promotion of South African manufacturing industries. At the Commercial Congress held at Lourenço Marquez in 1919 a resolution recommending an increase to a minimum of 5 per cent. was carried. The Rhodesian customs tariff closely follows that of the Union. The government policy has also been to bring the tariff of the South-West Protectorate into line with that of the Union.

[2] Not Drakensberg. The interpolation of the *s* in English books and newspapers is originally due to carelessness.

Sneeuwbergen, and then run east and north parallel to the coast. They are the highest mountains in South Africa, and descend inland to plateaux of more than 7,000 feet in altitude in Basutoland. The passes leading across them from Natal to the Orange River Province and the Transvaal are at the height of 5,500 feet and upwards. Still further north the higher mountains and tablelands of British South Africa, such as the Matoppo Hills in Matabililand, are all towards the east.

1167. Together with the physical features just described, the circumstance of most importance in determining the character of the **climate** of British South Africa is its situation between the trade-wind belts of the Indian Ocean and the South Atlantic; but it is to be carefully noted that a small portion in the extreme south-west receives winter rains from anti-trades. In the rainfall diagrams on p. 36 the curves for Durban and Loanda may be taken as more or less typical for the greater part of the region, and that of Cape Town for the extreme south-west. Loanda, however, shows a much greater rainfall than is to be found anywhere on the west side of British South Africa except in the extreme south (**66**). The karroos are subject to prolonged droughts, which cause them at times to present the appearance of hard, burnt-up deserts; but, on the other hand, they are occupied by a vegetation singularly adapted to a climate of this nature—able, that is to say, to survive, though in a withered condition, the want of rain for months, and even years, so that in a week or two after the occurrence of rains the surface becomes green with herbs and bushes or richly coloured with multitudes of flowering plants. In such a climate, however, cultivation, and even the rearing of live-stock, are obviously impossible without irrigation. Development in this direction has, however, made rapid strides during the past ten years. Technical and financial assistance is given by the State under the Union Irrigation and Conservation of Waters Act (1912). Throughout the greater part of the north-west of the Cape Province the annual rainfall is altogether insignificant. On a narrow strip of the south coast rains are fairly equally distributed all the year round, but the predominance of summer rains illustrated by the rainfall curve for Durban is the prevailing characteristic of eastern South Africa generally, owing to the fact that at that period an area of low barometric pressure in the interior greatly strengthens the trade-winds of the Indian Ocean and draws them powerfully inwards. Yet the curve for Durban is typical only for limited areas in the interior of South Africa. That curve shows a high rainfall throughout the summer. In a valuable report [1] made in 1901 at the instance of Lord Milner by Mr. (now Sir William) Willcocks, attention is called to the extremely important fact that in the greater part of South Africa it is only the rains at the end of summer culminating in February and March that fall with a fair amount of regularity and abundance. As

[1] Published in *Further Correspondence relating to Affairs in South Africa* [Cd. 1163], 1902.

this period of the year, in consequence of the high altitude and consequent rarity of the atmosphere, is immediately followed by a rigorous winter, those rains are useless for sowing. Accordingly only in a few parts sufficiently near the Drakenbergs to get rains in August and September can wheat be grown without irrigation. Sown at the time of those rains it is reaped in December. (See, however, what is said as to dry farming in pars. **101, 102.**) Maize and a few other crops suited to warm, rainy summers can be grown more widely. (Comp. **1384.**)

1168. The **rivers** of South Africa being mostly fed only by summer rains have the characteristics belonging to all tableland rivers in countries with alternating rainy and dry seasons. They flow in valleys deeply cut below the general surface of the country and having a width and slope varying with the nature of the rock in which they have been cut. In summer they are in flood, and in winter they are mostly reduced to tiny threads, which in some parts trickle between heaps of boulders filling a wide bed bordered by high bluffs. The Orange, though longer than the Rhine, is navigable for boats only a few miles up. Even the east side of British South Africa is practically without navigable rivers.

1169. So long as the development of South Africa was dependent solely on agriculture and pastoral industries the character of the climate confined the bulk of the inhabitants to the eastern side. In the latter part of the nineteenth century the discovery of valuable minerals, diamonds and gold, led to a much more rapid development, and these were also found on the eastern side. The diamond-fields of Kimberley, discovered in 1867, were the cause of the first long railway being built into the interior. A greater stimulus to railway construction was given by the discovery of the goldfields of the Rand in the southern Transvaal and the subsequent foundation of Johannesburg in 1886. For all these reasons it is only on the eastern side that there is a network of railways.

1170. The character of the coast-line as well as the superficial configuration have influenced the direction of the railways, and on all the lines into the interior the geographical features have necessitated the resort to heavy gradients. South Africa is almost entirely wanting in good natural harbours, and the points capable of being made convenient for shipping are at great distances from one another. In False Bay, east of the Cape Peninsula, there is an admirable naval station at Simon's Town, but that is not so situated as to be suitable for a commercial harbour. Cape Town is 428 nautical miles from Port Elizabeth, this port 131 miles from East London, and this again 253 miles from Durban, and Durban 300 miles from Lourenço Marquez [1]

[1] Lourenço Marquez harbour is now well equipped, and steamers are able to discharge alongside of the railway terminus, and Delagoa Bay affords access to the largest vessels at all seasons.

in Portuguese territory on Delagoa Bay; and these are the only ports at which it has been so far found worth while to provide accommodation by harbours or even long piers for the large ships of the present day. Strong currents on the south-east coast are constantly causing the accumulation of sediment, which powerful suction dredgers are required to remove. The strong south-easterly summer winds often prevent large ships from lying alongside the ends of the piers that have been constructed at Port Elizabeth,[1] and naturally more frequently by day than by night, when the rarefaction on the land is less and the indraught from the sea diminished. Saldanha Bay, about one degree north of Cape Town, forms an excellent natural harbour, and is linked up by rail with the Cape railway system. Phosphate deposits [2] of very considerable extent have been worked during the last few years in this neighbourhood.

1171. All the South African railways are on the gauge of 3 feet 6 inches.[3] The following table gives the distances by rail from the chief ports to the interior and the time taken by different routes between Johannesburg and the seaboard :—

Distances in Miles by Rail.

—	Cape Town	Port Elizabeth	East London	Durban	Lourenço Marquez	Beira
De Aar Junction .	502	338	—	—	—	1,537
Kimberley . .	647	485	—	—	—	—
Buluwayo . .	1,361	1,199	—	1,854	—	678
Salisbury . .	1,659	1,497	—	—	—	380
Bloemfontein . .	750	449	401	—	—	—
Johannesburg . .	957[4]	714	666	483	396	—
Pretoria . . .	1,001[4]	740	692	511	349	—
Barberton . .	1,284[4]	1,023	975	794	136	—
Windhoek . .	1,383	1,221	1,282	1,634	—	—
Time by Rail in Hours.						
To Johannesburg .	45½	34¾	34½	24	24	—
From ,, .	42½	34	33½	23	19½	131

[1] A scheme to construct a breakwater has been sanctioned by Parliament. It will have a length of 8,500 feet, and is to cost £1,500,000. This forms part of a scheme proposed by the Harbour Board to construct a sheltered harbour at a cost of 4½ millions.

[2] Analyses of the deposits are not uniform, but the phosphate chiefly occurs as phosphate of alumina, which from an agricultural point of view is insoluble. This difficulty should be easily overcome by treatment, and the deposits may prove of great commercial value. Their quantities are estimated by hundreds of thousands of tons. They are believed to be derived from guano and contain up to 35 per cent. of phosphoric acid. A full report of the occurrence by Dr. du Toit, Field Geologist to the Union, is published by the Geological Survey, Memoir No. 10, 1917.

[3] The electrification of the railways has been decided on in order to accelerate the rapidly growing traffic and so escape the necessity for widening the gauge or doubling the track. See, however, par. **1044**.

[4] By Fourteen Streams.

Greater distance is, however, in some cases partly compensated by easier gradients. A large proportion of the Natal railways have a gradient steeper than 1 in 35, and there are many curves of 300 to 350 feet radius. The line from Durban to Johannesburg, after ascending within sixty miles to about 3,000 feet, descends nearly 1,000 feet to Maritzburg, then in eleven miles climbs to 3,700 feet, and thirty miles further on is at a height of 4,800 feet. The Orange River Province branch ascends by steep gradients the whole way from Ladysmith (3,820 feet) to about 5,520 feet in Van Reenen's Pass. The line from Cape Town has curves as sharp as those on the Natal line, but the steepest gradients are from 1 in 40 to 1 in 45, and the highest altitude south of the Orange River is under 4,300 feet. On the line inwards from Port Elizabeth a gradient of 1 in 40 is necessary before Grahamstown is reached. The highest altitude on that line (near Naauwpoort) is just under 5,200 feet, and that on the East London route nearly 5,600 feet (three miles beyond Cyphergat). On the Delagoa Bay line the great rise is within the Transvaal. Belfast, where the Ermelo line branches off, is 6,460 feet above sea-level, and in the 112 miles to the east of that there is a rise of 5,190 feet, equal to an average of 1 in 113. The sharpest rise is, however, from twenty to thirty miles east of Belfast, where there is a rise of 680 feet in about four and a-half miles, equal to about 1 in 35. On this section a rack-rail is employed.

1172. Such physical conditions of necessity greatly diminished the value of the natural resources of South Africa and retarded their development; but the great value of the minerals holds out the prospect of more rapid development in the future. The local markets furnished by the gold and diamond fields may be expected to add greatly to the value of less costly minerals, such as coal, found in convenient situations in the interior of South Africa, and the development of these will still further extend the local market for agricultural products, and thus make remunerative works of irrigation which otherwise could not have been carried out at a profit. One promising sign is that South Africa has begun to ship thousands of tons of maize to Europe.[1] As to the **commerce** of the Union see the tables in the Appendix.[2]

1173. THE CAPE OF GOOD HOPE PROVINCE, formerly known popularly as the Cape Colony, embraces all South Africa to the Orange River and Natal, and in middle longitudes extends beyond the Orange to the Molopo. This last section comprises the territory of Griqualand West with the diamond fields of Kimberley and Beaconsfield, and the territory which till 1895 formed the Crown Colony of British Bechuanaland. The province also possesses the whaling station of Walvis Bay on the west coast of the South West Protectorate, about one degree

[1] In 1909, 91,000 tons of maize, and in 1917, upwards of a million tons were exported to Europe. Maize is carried to the ports at special rates irrespective of mileage.

[2] Total tonnage of cargo landed at ports of the Union in 1913, 2,391 thousand tons; in 1920, 2,073 thousand tons.

north of the Tropic of Capricorn. The population is mainly to be found in the east and on a narrow strip of the south coast, a necessary consequence of the facts already mentioned. More than three-fourths are coloured—Kaffirs forming the most numerous section, with a few Hottentots and Bushmen in the west, as well as immigrant Malays and others. The white population is mainly of Dutch, Huguenot, or British descent, and English and a corrupt Dutch are the principal languages.

1174. The Dutch first occupied Cape Town in 1652 as a half-way house on the route to their settlements in the East Indies. The French Huguenots came as refugees in 1688 after the revocation of the Edict of Nantes. They soon amalgamated with the Dutch, adopting their language, French being used for the last time in a church service in 1724. These two elements formed the peasant population known as Boers (farmers). The colony was twice occupied by the British during the Napoleonic wars, the second occupation taking place in 1806, since which date the colony has been a British possession. The most important British settlement made in the colony was that which was established in 1819 at Port Elizabeth on Algoa Bay, which has ever since been the chief British stronghold. The British and Dutch sections of the population have never properly amalgamated, which is partly due to the difference of occupation, partly to inconsiderate treatment of the Dutch in early days by the British home government. The Dutch are mainly farmers, the great majority pastoral farmers scattered over the country in farms of 2,000 to 6,000 acres or more in extent. The British are mostly traders living in the towns. As regards the government the Dutch complained chiefly of two things—first, that the government would neither defend them against Kaffir raids nor allow them to defend themselves, and second, that when their Kaffir slaves were liberated in 1834 the compensation offered was quite inadequate, and the manner in which it was given very prejudicial to the Boers. The proportion of British and Boers among the white population has never been ascertained, but it is certain that the Boers form the majority. It is usually said that the coloured population is increasing more rapidly than the white, but this is not borne out by the returns of the successive censuses.

1175. Only a small proportion of the surface is adapted for agriculture. In the western half of the province irrigation is absolutely necessary for the growing of crops, except in a small district round Cape Town, where most of the products of the Mediterranean can be grown, and whence there is a rapidly growing export of the characteristic fruits of that climate. In the eastern half larger areas have a sufficient rainfall for agriculture, especially south of the Stormbergen and Drakenbergen, but these are mostly in the hands of coloured natives, who grow maize (mealies) and other grains adapted to warm

Cape Town	160,000	Port Elizabeth	50,000

rainy summers. The prevailing aridity promotes a thorny vegetation which is apt to injure the quality of the wool of the sheep reared in the state **(1384)**.

1176. The pastoral industry has from the first been of much more importance than the growing of crops in the colony. At first only cattle and the native sheep were reared, the latter an animal yielding excellent mutton but only a coarse kind of hair rather than wool. The merino sheep was introduced about 1812, and after that wool came to be the most important export of the colony. The present wool industry of the Union has been built up by the careful selection of rams and the breeding of pure merinos. Among exports originating within the province it is still the next in importance after diamonds. The sheep are reared partly on grass on the coast strip, partly on the karroos, where they depend chiefly on a deep-rooted bush known as the karroo bush. In the arid western parts of the Great Karroo, from eight to twelve acres are required on the average for the support of a single sheep, but in the eastern parts only three. Hence it is from the eastern ports, Port Elizabeth, East London, and Port Alfred, that the great bulk of Cape wool is exported. Uitenhage, not far from Port Elizabeth, is the great wool-washing centre of the province. Graaff Reinet[1] is the chief centre of the most productive pastoral area of the eastern Karroo. Besides sheep and cattle, the Angora goat has been largely reared since about 1840 and the ostrich since about 1865. Oudtshoorn, a rich irrigated district in the western part of the Little Karroo, has extensive fields of lucerne (**623**) entirely devoted to the rearing of ostriches.

1177. The diamond fields of Kimberley have been actively worked since about 1869. The industry is now controlled by a few capitalists, who regulate both the methods and the amount of the production. Kaffir labourers are hired for terms of three months, during which they are never allowed to leave the works, where they live in enclosures known as compounds. The diamonds are found in a hard earthy matrix known to the miners from its colour as 'the blue.' Copper and coal are at present the only other two minerals of economic importance in the province. Copper is obtained in the nearly rainless district of the north-west, at the mines of O'okiep, whence the ore is conveyed by a mule railway to Port Nolloth for export. The coal production of the province is still small, but is increasing. The chief mines are at Indwe, on a branch railway running about sixty miles east from Cyphergat, about the highest part of the line from East London to the interior. The quality is not good, but the supply is of some importance for the neighbouring districts, including the southern part of the Orange River Province.

1178. In the parts of the province beyond the Great Kei river,

[1] Accent on the second syllable.

Kimberley . . . 50,000

known as the **Transkeian Territories,** which now (since 1894) include Pondoland, the white population is very scanty. Here the mouth of the St. John's River forms an exceptionally good harbour. The want in this case is a hinderland. The Drakenberg Range prevents this harbour from being a means of access to the interior, but the Territories are capable of greater development, forming one of the best parts of South Africa, fertile, well-watered, and eminently suited for pasture.

1179. Bechuanaland is a vast territory to the north of the Orange River and Griqualand West. It has a narrow strip adapted for maize and other cultures in the east, but in the west is mainly composed of the so-called Kalahari Desert, where the rainfall is very scanty, though there is much underground water, and where there is only a very small and scattered population of Bushmen, living as hunters. The Bechuana natives are skilled craftsmen, smelting and working iron and copper and carving wood. The part to the south of the Molopo and Nosob rivers or water-courses, with the towns of Vryburg and Mafeking, formed a part of Cape Colony from 1895. The remainder is a British Protectorate with Serowe, the residence of the leading Bechuana chief, as its capital.

1180. NATAL is a province with local self-government, extending from the Cape Province to Portuguese East Africa and the Transvaal, and separated from Basutoland and the Orange River Province by the Drakenberg Range. From the Transvaal it is separated mainly by the Pongola river, the territory of the former colony having been extended. As its surface rises rapidly in elevation from the coast to the interior, its climate may be said to change from sub-tropical to temperate in the same direction. Near the coast are grown sugar-cane, cotton, tea, arrowroot, black wattle (by far the most important of the minor forest industries of the Union), and other tropical and sub-tropical products, and sugar is an important export. Further inland are grown the temperate cereals, and sheep and cattle are reared. Wool is the chief export, but it is largely of external origin. Here also there is a large and rapidly increasing native population, mainly Zulu Kaffirs, who form the majority of the inhabitants, not only in the former Zululand north of the Tugela and Buffalo (annexed to Natal in 1897), but also in the former Natal. There are also above 100,000 Indians, originally introduced as coolie labourers on the tea and other plantations and as miners, but many of whom have remained as market gardeners and traders. The chief towns on the Natal railway system have already been mentioned (**1171**). Durban, the chief seaport, has a fine natural harbour, land-locked, deep, and capacious—Port Natal.[1] Pietermaritzburg, the capital, though at an altitude of 2,200 feet, is situated amid scenes

[1] The entrance, formerly barred, has been so cleared by powerful dredgers that in 1918 the average low-water depth was 35 feet. A floating dock capable of lifting 8,500 tons has been added to the equipment of the port.

Durban	100,000

of tropical beauty indeed, but in a hollow in which the heat is oppressive. In the extreme north of the province Newcastle and Dundee are rapidly increasing their production of coal,[1] which is better than that of the Cape Province, and, in spite of the long haul of 206 to 268 miles over the difficult railway route above described (**1171**), is now largely exported by sea and made use of as steam-coal by ocean liners. This is one of the regions of South Africa where the indirect influence of the goldfields (**1172**) is expected to promote the speedy development of an iron industry, for immense deposits of good iron ore are said to lie in the immediate neighbourhood of the coal. (See note to par. **1185.**) A fruit trade (in oranges and grapes, as well as the fruits of a cooler climate) is also being developed in the uplands along the railway route. St. Lucia Bay, the only important indentation of the coast in northern Natal, is worthless as a harbour.

1181. Basutoland is a British Crown colony almost entirely inhabited by a Bantu people of Bechuana stock. It consists of plateaux from 5,000 to 7,000 feet in height, sloping southwards and westwards from the Drakenberg Range, diversified by valleys, in some cases steep-sided, in others with gentle slopes. It has in most years a sufficient rainfall for the cultivation of wheat and other temperate crops, sown in July or August and reaped in December.

1182. THE ORANGE FREE STATE, situated between the Orange and Vaal rivers, is a former Boer republic annexed by the British in 1900. The population is made up of much the same elements as that of the Cape Province. The surface is typical veld country, rolling grassy plains seamed by river beds of the kind described in par. **1168.** The plains vary from under 3,500 feet in height in the west to about 5,500 in the east. The greater part of the colony has a rainfall inadequate for agriculture without irrigation, but the part in the south-east, known as the Conquered Territory,[2] forming the western half of the Caledon valley where that river forms the boundary between Basutoland and this colony, has generally a sufficient rainfall in early summer to allow of wheat cultivation (**1167**). The rainfall is also supplemented by numerous springs. This tract is universally considered the best in South Africa for European settlers. The north-eastern districts of the colony lack these August-October rains, but on the other hand have abundant rains from December to March, and are thus well adapted for the cultivation of maize. Sir William Willcocks estimates that 750,000 acres in the colony are capable of being irrigated with advantage. Among the minerals of the colony are diamonds in the south-west at Jagersfontein and Koffyfontein, and coal in the north of Kroonstad and elsewhere. The capital is Bloemfontein, situated, as shown on the railway map of Africa, on

[1] The total output of the coal mines in the Union in 1913 was 9·9 million tons, of which the Transvaal furnished 6·4 and Natal 2·6 millions.

[2] Because conquered from the Basutos.

the direct railway route from Port Elizabeth to Johannesburg and Pretoria. At Vereeniging, on the north frontier, the manufacture of various products from high-grade maize has been started.

1183. THE TRANSVAAL[1] is another former Boer republic annexed by the British in 1900. In Johannesburg and the Rand generally (that is, the great gold-mining district in the south) the majority of the white population is of British origin, but outside of the gold district the population is mainly Dutch, being descended from Boers who emigrated from the Cape Province in bitter discontent with British rule. The surface features are similar to those of the Orange River Province, but here the geological structure, even apart from the mineral wealth, is of great importance. Sir William Willcocks divides the territory into five regions. The most important is (1) the Dolomite Region, forming the middle section of the southern part stretching from the Vaal to the parallel of Pretoria. Dolomite is a rock composed of carbonate of lime and magnesia, subject like limestone generally to be hollowed out by the action of rain-water. It is thus rich in caves, which store up and ultimately discharge water in perennial springs, in sufficient abundance to supply not only the present great demands of the Rand, but also in all probability the much increased demands of that district in the future, and to leave a large surplus for the irrigation of cornfields, orchards, tobacco-plantations, and gardens. (2) The High Veld lying to the east of the Dolomite Region, composed of undulating grassy plains at an altitude of 4,700 to 5,700 feet, with very cold dry winters, but with a rainfall from January to March rendering it suitable for the cultivation, without irrigation, of maize, potatoes, and other roots, as well as of pulses, though these last are at present neglected. (3) The Bush Veld north of the Dolomite Region, and (4) the Low Veld to the east, in both of which the plains are generally below 3,000 feet in height, and hence, being in a latitude below 26° S., not well adapted for European settlement. Both are traversed by comparatively high ranges of hills. Farmers migrate (trek) from the High Veld to the Low Veld on account of the dying down of the grasses on the High Veld in the winter. (5) The South-western District, an arid and comparatively unproductive region. Sir William Willcocks estimates that about 500,000 acres in the high-lying tracts where Europeans can live and work and 1,000,000 acres in the low grounds are capable of being irrigated with advantage.

1184. The **mineral wealth** of the Transvaal is enormous in amount and varied in character. The first place belongs to gold, which is found in paying quantity in many parts of the country. The deposits first exploited were those of the De Kaap field in the east, in which the town of Barberton was founded in 1885. But this and all other deposits

[1] Population, census 1911, 1,686,000 (420,000 whites).

Johannesburg . . .	250,000	Pretoria	60,000

have been rendered of quite minor importance since the discovery, about the same time, of the goldfields of the Rand (Witwatersrand). On the richest part of the Rand the town of Johannesburg was founded in September 1886, and at a census held in 1896 the population of the town and district was found to have grown to upwards of 100,000, of whom about half were whites. The Rand is a ridge about sixty miles long, rising about 1,000 feet above the adjacent country. The gold-bearing rocks are a conglomerate, in which the gold occurs in the form of minute particles more or less evenly disseminated through it. Hence powerful machinery is required for its extraction, and from the first this has been a capitalist's, not a poor man's, goldfield. Naturally every effort has been made to develop the field with the utmost rapidity. The chief difficulty consists in devising means for attracting labourers on the terms most profitable to the owners of the mines.[1] In 1888 the total production was 208,000 ounces; in 1898, the last year before the Boer war, it was 3,823,000 ounces.[2] The principal other goldfields of the Transvaal are those of Malmani in the west, Pietersburg in the north, and the Zoutpansberg district in the north-east.

1185. The Transvaal is also rich in other minerals. Coal has been mined almost since the foundation of Johannesburg at Boksburg, a short distance to the east. It occurs in greater abundance at Middelburg, and not far off there is said to be a great abundance of excellent iron ore in the Ermelo district. The valuable local market at Johannesburg may accordingly be expected to stimulate the rise of an iron industry in the near future.[3]

1186. RHODESIA, extending northwards from the eastern part of Bechuanaland and the Transvaal to the Congo Territory, was brought by treaty within the sphere of British influence in 1888. Most of that part of it which lies south of the Zambezi, even though it reaches far within the Tropic of Capricorn, may be included in temperate South Africa, inasmuch as it embraces a large extent of tableland from 4,000 to 5,000 feet in height, with tracts healthy for Europeans. Sleeping

[1] After the South African war, the difficulty in obtaining white or native labour to work in the mines resulted in Chinese coolies being introduced. These were gradually repatriated, and in 1909 the Transvaal-Mozambique Agreement licensed recruiting agents, under certain conditions, to engage natives of Portuguese territory for service in the Transvaal mines, from south of 22° S.

[2] Fine gold; in 1913, 8,795; in 1916, 9,296 (maximum); in 1918, 8,421 thousand ounces.

[3] What are described as inexhaustible quantities of rich iron ore, containing upwards of 60 % of metallic iron, are found in lenticular deposits all round the Bush Veld. These, it is stated, cannot in present conditions be worked with profit, but they are said to be amongst the largest in the world awaiting development (*Iron Ore Resources of the World*, vol. ii., p. 1060). The iron and steel industry of South Africa was greatly stimulated by the war, and according to a Report by Mr. W. G. Wickham, senior British Trade Commissioner in South Africa, issued in 1921, 'enormous developments in the production of pig-iron and steel on a commercial scale from local ore are pending.'

sickness **(128)** has appeared, but not to any extent. The higher parts of the tableland are in Matabililand in the south round the Matoppo Hills, a district taking its name from a warlike tribe of the Zulu family which once held sway over a vast area round about, and in Mashonaland in the north, a district named after a peaceful industrial tribe formerly subject to the Matabili. The natives are remarkably submissive to white rule, recognizing the greater security of property afforded, as compared with former times. The British South Africa Company, which obtained a royal charter in 1889, here has its principal field of operations. The charter empowers the company, among other things, to acquire rights of government, but reserves to the Crown the right of assuming dominion if it sees fit. The first settlement made by the company was at Salisbury in Mashonaland. In 1894 a war with the Matabili led to the occupation of their territory by the company, and there a well-built town now takes the place of the former Matabili capital of Buluwayo, which since 1897 has been connected with Cape Town by rail (**1171**). In the higher parts of the region the rainfall is fairly plentiful, and even European crops are grown with success.[1] In Southern Rhodesia maize and tobacco are becoming very important crops. Ninety million acres of land in Rhodesia are suitable for cattle ranching, but will not carry the heavy British breeds. Gold exists in many places,[2] and is largely produced.[3] The Wankie coalfield is said to contain coal little inferior to that of Cardiff.[4] The Victoria Falls,[5] are not far off, where the Zambezi, a mile wide, plunges a height of 343 feet into a narrow gorge.

1187. North of the Zambezi lie the administrative divisions of North-western and North-eastern Rhodesia, which are in great part separated by the Kafukwe or Kafue river.

North-eastern Rhodesia has been divided into several districts, and contains a number of stations with good brick and iron buildings ; among these, Fife on the Stevenson Road, connecting Lakes Nyasa and Tanganyika, and Abercorn at the south-east end of Lake Tanganyika. Mines of lead and zinc are worked on the 'Cape-to-Cairo'

[1] One of the finest irrigation works in South Africa is nearing completion on the Mazoe River in the north-east corner of Southern Rhodesia. A big dam has been built and an extensive system of subsidiary channels is in course of preparation for the purpose of irrigating adjoining lands. The reservoir formed by the dam will have an approximate area of four square miles and a capacity of some five thousand million gallons.

[2] Ancient ruins show that gold was worked in this region at some remote period. The most remarkable of these are the Zimbabye or Zimbabwe ruins, about 180 miles due east of Buluwayo.

[3] Gold produced in 1898, 16,378; in 1913, 690,000; in 1916, 930,000 (maximum); in 1918, 631,000 ounces.

[4] Deposits of iron ore similar to those of the Lake Superior region of the United States and exceeding them in extent are reported.

[5] The railway was opened to the Victoria Falls in June 1904, and a bridge 650 feet long was completed in the following year. It is not unlikely that the falls will be harnessed and made available for water-power within the next few years.

railway at Broken Hill in about 14½° S. Good cotton has been grown in this division. North-western Rhodesia is still mainly under native rule, but two British district officers have been appointed, one for the Batoka district in the south-east and one for the Barotse district to the north-west. The chief settlements of the Barotse (capital Lealui) are in a low-lying, marshy, and unhealthy but fertile valley on both banks of the Zambezi, where that river flows from north to south, a valley about 150 miles in length by 25 in width, annually inundated during the rainy season, which lasts from the end of November to March or April. Iron ores of high quality abound in this and the neighbouring valleys.

1188. West Africa between the Cape Province and lat. 18° S., with the exception of Walvis Bay (**1173**), formerly under German protection, was annexed to the Union in 1919 as the South-west Protectorate. At present this region has hardly any commercial products, but it is well adapted for cattle-rearing. The southern part and much of the east is barren and desert, but there have been extensive boring operations for water, many of them very successful. Walvis Bay is the best natural outlet for the territory, but the Germans had formed an independent harbour at Swakopmünd, a little to the north, and made a railway thence to Windhuk, the seat of administration in the interior, near which copper is known to exist in considerable quantity. Cotton of very high quality, of long and very fine staple, has been grown on the route of this railway. Copper also occurs at Otavi, in the north of the territory, and other minerals known to exist in payable quantities are diamonds, ores of tin, lead, and iron, and marble. The want of means of communication has hitherto prevented any great area of the land being brought under cultivation.[1] Irrigation schemes on a small scale were begun by the Germans, but without irrigation on a wide scale agriculture cannot be developed to any extent. The karakul sheep, from which 'Persian' lambskins are obtained, was introduced by the German government in 1907, and crossed with native sheep has yielded satisfactory results, especially on the higher plateau of Damaraland and Namaqualand.

1189. TROPICAL AFRICA. This is the part of the continent that yields least to commerce, and most of it affords little prospect of yielding much more in the near future. Oil and oil-seeds, ivory, rubber, gums, and spices make up the bulk of the exports from these regions, and the total value of them, especially of the last two, is insignificant. These products, moreover, are largely, if not mainly, obtained by the system known to the Germans as 'robber-economy,' the system that destroys what furnishes the product, so that one has to penetrate to a greater distance inland in search of commodities of which the regions

[1] In 1913 the figures showed that with a total holding of 1,330 farms of 33 million acres, only 13,000 acres were cultivated, the chief crops produced being maize, potatoes, and pumpkins.

first visited have been denuded. The regular cultivation of products for export is confined to very limited areas.

1190. The causes of this state of matters are various. In the first place, there is only a comparatively limited area in which there is a strong settled government. The most conspicuous exception to this general statement is that offered by the native states between the Niger and Lake Chad, more particularly the great Hausa states of Sokoto, Gandu, and Adamawa, as well as Bornu. More or less civilised communities have existed there for hundreds of years, though the Fula dynasties now reigning in the Hausa states have held sway there only since the beginning of the nineteenth century. Their sway is vigorous, but till the British intervened, its advantages were greatly reduced by the fact that it countenanced slave-raiding. You might travel, according to Mr. J. Thomson, as safely through the Hausa states as through Great Britain. The air is dry and exhilarating, though the temperature is high. The soil is much more fertile than is commonly the case in Africa. The rains are adequate. The fields are consequently well cultivated, and produce abundance of durrah (**422**), maize, cotton, and other crops. The horse, camel, ox, and donkey flourish. There are large towns, with a population in some cases of as much as 150,000. The people are expert in many handicrafts, including the working of brass and other metals. They are fond of voluminous garments, and delight in adorning even their horses with silks and velvets, tassels, and tinkling bells.

1191. Here it may be noted that these states are all Mohammedan, and that it is apparently since the introduction of Mohammedanism that the civilisation just described reached its present stage of development. Mohammedanism has, in fact, hitherto proved the most powerful civilising agent in central Africa. Its influence is still spreading, and it has already conquered the whole area from the Atlantic to the Indian Ocean as far as 6° N. lat., and in some parts even further south.

1192. On the other hand, the slave-trade, as practised till a recent date by the Arabs, the people among whom Mohammedanism arose, was perhaps the chief hindrance to the establishment of settled government in central Africa, and the second great obstacle to the development of trade with that region. Throughout the greater part of this region Arabs carried on the trade in ivory and the trade in slaves hand-in-hand. They went wherever ivory could be accumulated, and when they had collected their store of this valuable commodity they seized or purchased natives to serve as bearers, and finally to be sold as slaves.

1193. Thirdly, the climate of central Africa is an obstacle to its development. The climate, like that of all tropical regions, is enervating and unfavourable to labour. On all the lowlands malaria (**127**) prevails, and it is not even absent from the tropical plateaux. Among Europeans this causes an appalling mortality, and even natives do not escape it. Over a large part of tropical and in the east sub-tropical

Africa, between about 15° N. and 17½° S. in the west and 4° N. and 27½° S. in the east, range the various species of tsetse fly (*Glossina*), several of which have been proved to introduce fatal diseases into the bodies both of man (**128**) and the larger domestic animals, principally cattle and horses. From most of them, however, the open grass country is free. Cattle and horses have also suffered greatly from ticks, not merely within the tropics but far south of the Tropic of Capricorn, but these diseases are now fairly well coped with by means of prophylactics.

1194. Fourthly, the soil of central Africa is generally far from fertile. Large areas of the plateau of eastern Africa are hopelessly barren. The fertile volcanic soil in the neighbourhood of Mounts Kenya and Kilimanjaro, east of Lake Victoria Nyanza, is quite an exception, and even there the country is burnt up for eight or nine months in the year. Vast areas in the Congo basin and elsewhere are covered with that insatiably thirsty soil known as laterite (**85**).

1195. Fifthly, the means of communication with the interior are very defective, but are improving. On the north, the great desert of Sahara intervenes between the Mediterranean and North Atlantic seaports and the Sudan, and in the east there are deserts of greater or less width everywhere north of the equator, between the coast and the more fertile highlands of the Nile basin.

1196. The navigation of nearly all the great rivers is interrupted by rapids and falls. Above the limit mentioned in par. **1152** the Nile navigation is interrupted for more than a degree of latitude before Lake Albert Nyanza is reached, and long stretches of the Victoria Nile between the Victoria and the Albert Nyanza are also unnavigable. The lower half of the Senegal is navigable for gunboats, but the upper half is obstructed by numerous difficult rapids, some impassable for the greater part of the year. The unbroken navigation of the Niger basin is of much more importance than that of any other African river except the Nile, regard being had to the situation of the most productive regions belonging to it. Vessels of 600 tons can ascend for seven or eight months in the year as high as Rabba, a little above the confluence of the Benue. There navigation is almost wholly interrupted [1] by a long series of rapids, and even above those rapids the navigation is very difficult as high as about 15° 40′ N., but above that point the Niger is navigated for hundreds of miles by large and swift canoes manned by from forty to fifty men. The Benue, the great tributary of the Niger, which traverses the southern part of the Hausa states, is navigable to about 13° E., that is, for nearly the whole of its western course. The Congo is navigable for ocean vessels to Matadi, ninety-three miles from its mouth, but for the next 226 miles, where it breaks through the African plateau, is unnavigable. There follows,

[1] The whole length of these rapids has several times been navigated by French officers, but in conditions that do not warrant the hope of commercial utilisation.

however, a stretch of 1,044 miles of uninterrupted navigation between the outlet of Stanley Pool and Stanley Falls, situated just above the place where the river first crosses the equator. Above that again there is an unnavigable stretch of ninety-seven miles, followed by 196 miles of navigation between Ponthierville and Kindu, then another obstructed tract of 202 miles, above which, between Port d'Enfer and Kalengwe, there is a final navigable stretch of 398 miles. A railway, opened in March 1898, avoids the rapids and falls between Matadi and Leopoldville [1] on Stanley Pool, and the great tributaries on its left bank all have their navigation stopped in the same way between about 5° and 6° south; and the Ubangi, the most important tributary on the right bank (now proved to be the lower course of the Welle), has somewhat difficult rapids in 4° 20′ N.[2] The Zambezi, the only great river on the east side of the continent, not only has impassable rapids in its lower course (about the place where it turns to the south-east), but till quite recently it was not known to have any mouth without a shallow bar. The Shire, the tributary on the left bank which forms the outlet of Lake Nyasa, has its navigation interrupted by a cataract about midway between the lake and the Zambezi, and is navigable only by boats drawing no more than 18 inches—the largest of about 40 tons burden.

1197. Before the beginning of the present century roads fit for wheeled vehicles, motors, and railways were scarcely known. The only means of carriage available in the greater part of this region were thus pack animals and human carriers. Even yet the old-established routes of central Africa, though forming an intricate network connecting every village, are mere beaten tracks of small width.

1198. The beasts of burden most in use are the camel, the indispensable carrier of the desert, and the ox. A camel caravan (**134**) takes about three months to cross the Sahara by the shortest and easiest route from central Sudan to the Mediterranean—that, namely, by the oases of Fezzan to Tripoli. The average rate is thus about fifteen to eighteen miles a day. A caravan of human porters, where this method of carriage is best organised, as in Portuguese Africa on the west coast and on the routes between the great lakes and the sea on the east coast, travels at the rate of from eighteen to twenty-three miles a day, each

[1] Construction of a canal between Matadi and Leopoldville at a cost of £4,000,000 has been proposed with a view to relieving the congestion on the railways. A 4-inch pipe line, for the purpose of transporting crude oil for the use of river steamers, was constructed from Matadi to Leopoldville (1913), where there are a floating dock, several large shipways, and ample facilities for construction and repairs.

[2] Many small steamers and motor boats now ply on the upper river and its branches, including about twenty possessed by the Belgian Administrator, and about fifty by private firms. As a result of the opening of the Belgian Congo to free trade in 1912 and the abandonment of the government monopoly in rubber and ivory, the government steamers had to make the return journey empty, for traders could not afford to pay the high freights charged. The freight rates were consequently reduced 50 per cent.

porter bearing a load of about 50 lbs., in some cases as much as 120 lbs. The ox will bear a load of about 150 lbs. on an average, but the use of this beast of burden is prevented throughout a large part of the region now described by the occurrence of the tsetse fly (**1193**). The Indian elephant has been tried in African exploration with indifferent success ; but it has been urged by persons well acquainted with the conditions of African transport that the African elephant could be used with greater success in opening that region, and since the beginning of the present century a number have been domesticated and trained for field labour with some success. (See par. **133.**)

1199. For the development of commerce with inner Africa in the near future the most hopeful augury is to be found in the fact that European nations are now seriously endeavouring to push their influence further and further into the interior.

1200. French influence prevails over the greater part of the north-west. The French colony of the Senegal now confines to a narrow strip the British settlements on the Gambia, at the mouth of which stands Fort Bathurst. The river is the main line of internal communication and is navigable for ocean-going steamers for 200 miles, in all seasons. A coast railway has been laid in French territory (from St. Louis, the capital, to Dakkar at Cape Verde), and a railway to connect the navigation of the Senegal with that of the upper Niger is partially constructed. The portion between Kayes and the Niger is of far-reaching value to the territory, and since its completion the prosperity of the colony has rapidly increased.[1] The region supplies chiefly ground-nuts, sesame, palm-kernels, and other oil-seeds to the market of Marseilles.[2] The rearing of cattle and sheep is one of the most important occupations in the territory.[3] Gold is found but not exploited to any extent. Timbuktu, situated at the distance of a few miles from the upper Niger, but far below the point of junction of the railway, formerly the chief centre of the caravan trade on the southern borders of the western Sahara, has lost much of its importance. Among other commodities in which trade is carried on is salt, which is obtained at Taudenit, 260 miles north of Timbuktu, and is almost wholly wanting in the Sudan. Sierra Leone, a British colony to the south-east, furnishes similar products, but palm-oil, palm-kernels, and kola-nuts begin to predominate, and these form the chief exports along the coast of Upper Guinea as far as the Congo. Freetown, the capital of Sierra Leone, is

[1] The French have a far-reaching scheme for further railway construction in French West Africa which will include the linking together of the railways already existing in the various colonies.

[2] The French government propose to construct important irrigation works in the Niger valley and to the north of Timbuktu.

[3] In 1914 there were 2,000,000 cattle and upwards of 3,000,000 sheep and goats in the territory. The greater part of the export trade is with the coast colonies. At Bamako a factory for meat extracts, preserves, and animal by-products has been built, and it is estimated that when in full activity it will be able to deal with 30,000 to 40,000 head annually.

on the Rokelle River, the broad estuary of which forms an excellent harbour. The town was formerly very unhealthy, but the danger to the white population has been mitigated by sanitation and precautions against mosquitoes. Sherbro, in the eastern district, lies at the mouth of a river admitting vessels of 17- or 18- feet draught, and is growing in importance. French Guinea surrounds this colony on the north and the interior, and on the east follows the native republic of Liberia.[1] All the Ivory Coast, with the ports of Grand Bassam and Abidjan, is now in French hands. The British colony of the Gold Coast, with the protectorate of Ashanti, comes next. Gold has of late years again become the leading export ; diamonds were discovered in 1919, and there are large deposits of manganese ore,[2] but the export of cacao,[3] the cultivation of which is interesting as a thriving native industry, has risen with equal rapidity. A railway runs from Sekondi[4] in the west to the gold-mining Tarkwa district, another from Accra in the east to the cacao district, and survey for further constructions to link up Coomassie to Accra are in hand. Cape Coast Castle is still without a railway. The former German colony of Togoland, now administered by England and France, next follows with the seaport of Lome, and then the French protectorate of Dahomey with that of Porto Novo.

1201. The whole of the coast line of Upper Guinea from Liberia eastwards has a similar character to that on the east of the Indian peninsula, and it is no doubt to be ascribed to a similar cause. Though the prevailing winds all the year round are from the sea, these winds frequently give place in the early months of the year (January to April) when the southern seas are at their highest temperature and the inland parts of north Africa coolest, to a strong northerly exceedingly dry dust-laden wind, the harmattan, cool in the morning and evening but very oppressive during the day. The dust is blown in large quantities seawards, which quite accounts for the shallowness of the sea, the uniformity of the surf-beaten coast-line, and the absence of natural harbours, as well as the fact that the mouths of the rivers and the entrances to the coast lagoons are encumbered by bars. The flat coast-strips are everywhere very unhealthy.

1202. To the east of Dahomey lies the extensive territory of Nigeria, now under British rule or influence, and forming one of the most promising regions of the continent. The protectorate since 1914 is in two main divisions—the Northern and the Southern Provinces. The unhealthy town of Lagos, the former administrative centre, has been superseded by Yaba, at an altitude of over 2,000 feet, near the

[1] Liberia is reported to be rich in payable gold and diamonds, as well as in iron, copper, and other minerals.

[2] In 1918, 30,000 tons of manganese ore were shipped to the United Kingdom.

[3] The export of cacao, which was less than a thousand tons in 1891, had increased to 90,000 tons in 1919.

[4] By the construction of a breakwater 7,500 feet long, enclosing water with a depth of 20 feet, a harbour is about to be constructed (end of 1921) at Takoradi, four miles from Sekondi.

point at which the Lagos-Kano railway crosses the Kaduna. Northern Nigeria is the part containing the most civilised communities (**1190**) and the most populous industrial and commercial towns. The Hausa are by all accounts the most vigorous race in west Africa, remarkable for their physical strength. Their language is estimated to be spoken by about 15,000,000 people, and is a *lingua franca* for a wide region. Of the towns, none of which is at a greater altitude than 2,500 feet, the most important is the mud-walled city of Kano, said to be situated in a district cultivated like a garden in every direction, and noted for hundreds of years as the place of manufacture of cottons and fine kinds of leather (including Morocco leather), which are sold in every part of north Africa. This fact in itself appears to warrant the expectation of a greatly extended commercial development with improved means of communication. A great variety of European goods already reach it from the Mediterranean. As many as 12,000 camel-loads are said to be brought thence annually to Kano, but that probably indicates at most about 2,000 tons. To the north-west of Kano is Katsena, the chief seat of learning in Sokoto. The development of all this region in the past has been hindered mainly by the extreme unhealthiness of the coast, the inadequacy of the communications with the interior, and the ravages caused by the practice of slave-raiding. This was abolished throughout the Protectorate in **1917**. The waterways of the Niger and Benue unfortunately do not serve as means of communication with the most populous and civilised parts of that region, these lying in the higher grounds towards the north at some distance east of the Niger.

1203. The exports of Nigeria are at present mainly derived from the forests immediately behind the ports—palm-oil, palm-kernels, and rubber being the chief. Cacao plantations are being fostered by the Government, and native instructors give curing demonstrations in the Abeokuta and Oyo Provinces [1]; and from Lagos some sample cargoes of cotton [2] have been sent in the last few years. The cotton is of good average quality, and its cultivation is being actively encouraged. The chief obstacle to expansion, however, is that there are few adjacent lands suitable for planting. The main trade artery, leaving the Niger out of account, is the railway from Lagos to Zaria and Kano, the capitals of the northern cotton region (705 miles). The extension of this line to Lake Chad would open vast possibilities. On the left shore of the lake is a rich strip of land exactly similar to that of the Sudan cotton districts. Here the cotton crops would not be exposed

[1] Notwithstanding the adverse conditions which obtained between 1913 and 1918 the export of cacao doubled. In 1918, 204,000 cwts. were exported.

[2] The export of raw cotton from Lagos increased from 290,000 lbs. in 1903 to 7,447,000 lbs. in 1916 and 1,480,000 lbs. in 1918. The yearly variations are accounted for partly by climatic conditions and partly by competition of other crops of a more speculative nature.

to the vagaries of the rainy season, for annual inundations to a depth of six miles inland would make irrigation easy and possible. Labour difficulties would also be fewer. In the coast strips, however, there is likely to be great difficulty in inducing the natives to engage in the steady industry necessary for any rapid extension of this culture, and probably much better results in this direction are to be looked for by the establishment of such means of communication as would make it practicable to bring down not merely raw cotton, but also oil-seeds, hides, and other bulky products from the more densely peopled and civilised hinderland in the north. Jute, another possible raw product of Lagos and Nigeria, could be grown only on the coast strip. Rich alluvial deposits of tin ore have been discovered at Naraguta in the Northern Provinces. The tin bearing area is known to extend over 9,000 square miles. A colliery, which has been opened by the government at Udi in the Southern Provinces, is connected by rail with Port Harcourt on the Bonny River.[1] Gold is also mined near Mimra in the Niger Province.

1204. Lagos, the chief port of the division of the same name, stands on a small island within a lagoon the entrance to which has a shifting bar with a depth formerly varying from 9 to no more than 15 feet, so that large vessels had to load and discharge outside on a somewhat dangerous coast.[2] Burutu or Bludu on the Forcados arm of the Niger delta in the west of Southern Nigeria, a port accessible to vessels of large draught, is hence rising in importance as an *entrepôt*, from which the goods brought in ocean steamers are distributed by smaller coasters. Akassa, at the mouth of the main stream of the Niger, suffers from the same defects as Lagos, but Old Calabar or Duke Town in the east of Southern Nigeria has a deep and commodious harbour. See also the tables in the Appendix.

1205. Adjoining Nigeria from the coast to Lake Chad is the Cameroon Protectorate (formerly German), now administered by Britain and France, yielding similar forest products, along with coffee and cacao grown on the slopes of the Cameroon mountain. Victoria, where vessels of 14-feet draught can lie alongside the jetties, is the chief port. This protectorate is followed by the French Congo Territory, extending from the coast to the Congo and the lower part of the Mobangi. The resources of this territory are quite undeveloped. Corisco Bay, in the north of this region, is a Spanish possession. The whole of the coast south of the Congo as far as the river Kunene belongs to Portugal, and so too does a small portion to the north of the Congo. The land on the northern side of the estuary of the Congo, together with

[1] The output of coal increased from 24,500 tons in 1916 to 148,214 tons in 1918. The greater part is used by the railway and other government services, the balance being sold to ships visiting Port Harcourt.

[2] At great cost the harbour was extended in 1918, and dredging operations carried out that year permitted the bar draught to be raised to 21 feet.

the greater part of the Congo basin east of the Ubangi, belongs to the Congo Territory, which existed from 1885 to February 1909 as the Congo Free State under the rule of the King of Belgium, but was annexed at the latter date to the Belgian kingdom, with the result, it would appear, of bringing about a great improvement in the system of government.

1206. By the international treaty under which the former state was founded no import duties could be levied by the state, but this provision was annulled in 1890, and there is now a common import tariff with the adjoining French and Portuguese territories. Steamers are maintained by the state above and below the falls. There has since been a great increase in the export of rubber, which is now by far the most important of the exports, which also include ivory and palm-kernels. The district of Katanga, or Garenganze, an elevated region (4,000 to 7,000 feet above sea level), in the south-east of the state, belongs geographically to Rhodesia rather than the Congo. This district is a copper country ; its southern copper belt is said to extend for a distance of 200 miles, with a breadth of from 35 to 60 miles.[1] Iron-stone and lime are also obtained in close proximity to the copper mines, and gold, iron, tin, and diamonds are worked.[2] In this district a great deal of labour has been expended on the construction of roads. Although this district is extremely fertile, its great distance from the sea and the smallness of its white population have prevented the exploitation of its vegetable wealth. Stock raising is successfully engaged in and offers a promising future. Boma is the administrative capital and the port for the Mayumbe region, but has no shipbuilding facilities. Matadi, nearly 100 miles from the coast, is the port for the whole of the interior, and can be reached by ocean going vessels. There are ample docks and quay accommodation.[3] Above Leopoldville the chief town is New Antwerp (formerly Bangala), situated about the point where the course of the Congo changes from westerly to southerly.

1207. The Portuguese territories south of the Congo and within the drainage area of the Congo River comprise some of the finest land in tropical Africa. There are large districts in the north more than 5,000 feet in height, and consequently with a climate almost European. The three seaports of Loanda, Benguela, and Mossamedes (the first and last with two of the finest natural harbours on the west coast) give name to three provinces, and a few miles to the north of Benguela, in 12° 20′ S., a fine natural harbour is formed by Lobito Bay, the

[1] It is estimated that 40,000 tons of metal and matte will be produced annually, in which case Katanga would be one of the most productive copper fields in the world. In 1911 the production of copper was 1,000 tons and in 1916, 22,200 tons.

[2] Most of the labour for the mines has hitherto been recruited from Rhodesia and Portuguese territory, and some also from Northern Nigeria, but now that the railway has been completed to Bukama, it is probable that recruits as well as food supplies will be drawn largely from the north.

[3] An additional port is to be established at Ango-Ango, three miles lower down, opposite the Portuguese port of Noki.

terminus of the Benguela-Lobito railway (322 miles).[1] The chief exports are coffee, rubber—plantation rubber is being rapidly substituted for wild rubber—palm-oil (the oil-palm flourishing as far as 10° S.), ivory, and, in the south, cotton. The Kwanza, the chief river in the north, is navigable for 200 miles (to Dondo). The seaboard abounds in fish, and Norwegian and American whalers who have undertaken to fish the coasts are starting large factories on shore for the extraction of the oil. Salt is extensively worked on the coast between Quisembo and Ambrizette.[2]

1208. In **East Africa** the Portuguese have for hundreds of years claimed authority over the coast from Delagoa Bay [3] to Cape Delgado. The limit of their authority in the interior was, however, undefined till 1891, when a treaty was concluded with Great Britain fixing approximately the common boundary of the sphere of influence of these two powers. Under this treaty the Portuguese territory north of the Zambezi embraces both banks of the lower Shire, and a large area as far west as the Loangwa (about 30° E.). In accordance with the Treaty of Versailles, the Peace Conference (1919) allotted to Portugal the territory south of the Rovuma, known as the 'Kionga Triangle' (formerly part of German East Africa). South of the Zambezi the boundary lies for the most part to the east of 33° E. The fine harbour of Beira, at the mouth of the Pungwe River, accommodating at spring-tides the largest ships, is now the port of Mashonaland (**1171, 1186**). A little to the south is the old port of Sofala, visited by Arabs even in the middle ages (**1034**). Chinde, at the mouth of the most easily navigated branch of the delta of the Zambezi, having a depth on the bar varying from twelve to eighteen feet, has now quite superseded the old port of Quilimane (Kiliman). Mozambique, further north, has a small local trade. The Inhambane district to the north of Lourenço Marquez forms a great recruiting centre for labour for the Transvaal. The chief products are sugar, coco-nuts, and bees' wax. Important gold deposits have been discovered on the Zambezi and extensive coal deposits in the Tete region.[4]

1209. The **Nyasaland Protectorate**,[5] or British Central Africa, as it was formerly called, is a territory, under direct British adminis-

[1] The Benguela-Lobito railway from Lobito to the Katanga copper district will be over 1,400 miles in length when completed. A further 67 miles are now under construction, 415 in project in Angola and 527 in Belgian territory, and will reduce the distance from London to Kambove to 6,457 miles, as compared with 8,480 by Cape Town and 8,890 miles by Beira and the shortened railway thence through Broken Hill.

[2] Schemes for the utilisation of the falls of Dande Lukalla and Kwenza River for electric power are now progressing. Irrigation works also await progress.

[3] See note to par. **1170**.

[4] A line from Mozambique to Nyasaland connecting with Shire Highlands about 300 miles long has been projected. Another from Beira to the Zambezi is to be constructed forthwith.

[5] Reckoned as part of Rhodesia, but under the administration of a Commissioner appointed by the Crown.

tration, lying west and south of Lake Nyasa, and including the islands in that lake, and traversed in the south by the Shire River, along which it stretches on the left bank to the Ruo, and on the right bank to within a few miles of the Zambezi. This region was opened up by British missionaries and the African Lakes Company (also British) many years before it was proclaimed a British protectorate in 1891. On the Shire Highlands east of the middle Shire (**1196**) stand Blantyre, the chief station of planters, and Zomba, the seat of administration. Coffee of excellent quality was at one time the chief plantation product, but since 1900 the production has declined. The government is fostering native agriculture and cotton is now the most promising crop, and tobacco, from American seed, is grown with success, but at present only for South African consumption. Roads suitable for ox-wagons are plentiful in the Protectorate. With the exception of the Shire valley and strips along L. Nyasa and the brackish Lake Chilwa nearly all the territory is above 3,000 feet in height. The Mlanje Mountains south of L. Chilwa are above 8,000 feet in height, and near the north of the territory is a plateau called the Nyika Plateau, about 1,200 square miles in extent, with an average altitude of 7,000 feet, on which it might be possible for European colonists to thrive. The Kivu plateau with an altitude of 8,500 feet has a delightful climate suitable for Europeans. It is not infested with ants or mosquitoes. On no parts yet settled is it possible for Europeans to do manual labour.

1210. North of Portuguese territory nearly the whole of East Africa to about lat. 18° N. on the Red Sea is now partitioned into regions declared to be under British and Italian influence respectively.

1211. Tanganyika Territory, formerly German East Africa, extends from the River Rovuma northwards to Kenya Colony and westwards to Lakes Nyasa, Tanganyika, and Victoria Nyanza, and includes the island of Mafia. Good natural harbours for vessels up to about sixteen feet draught are afforded by the bays of Dar-es-Salam′ and Mikindani; Bagamoyo has only an open roadstead, and Tanga and the other ports have bars allowing access only to Arab dhows or other small vessels. Dar-es-Salam′, the seat of administration, is the coast terminus of the Central Railway (780 miles), which runs to Ujiji on Lake Tanganyika and there links up by steamer with the Cape to Cairo Railway. Another line was completed in 1914. There are wide, well-kept roads throughout the territory where various tropical plantations have been established. The chief exports are henequen (sisal), cotton, hides, copra, wax, rubber, and ivory.

1212. British East Africa, now **Kenya Colony,** embraces all the territory from the northern frontier of Tanganyika territory to the river Jub, which separates it from the Italian Somaliland, stretching in the interior to the British-Egyptian Sudan on the north and the Congo Territory on the west. This territory is, however, under different administrations. The greater part of it forms the British East Africa

Protectorate, which has a fertile, well-cultivated, but unhealthy coast strip producing gum copal, rubber, ivory, and other products, but in the interior is largely made up of deserts, although there are also considerable tracts of healthy highlands (Kikuyu, Kenya, Laikipia, Mau, &c.), forest clad and adapted for the cultivation of tobacco and even European grains and roots (potatoes), but on the whole so little productive that the estimated population is under ten to the square mile. It is significant of the remarkable climatic conditions round the base of Mount Kenya that the principal European plantation crops there are coffee, flax (for fibre), and henequen. The mineral resources have not yet been fully explored, but do not appear to be very great. Extensive deposits of natural soda have been discovered at Magadi in about 1° 50′ S., and 36° 15′ E., to which a railway has run since 1913 from the 281st mile of the Uganda railway, descending 4,000 feet within a short distance from its summit level of about 6,000 feet. The parts round Lake Victoria Nyanza form the Protectorate of **Uganda**, which has much fertile land, fairly healthy except in the lower grounds. Even here, however, the estimated population is little more than twenty to the square mile. The natives have probably greater property in cattle than any other country in the world. The sheep industry is very heavily backed by British capital. Of the ports of the East Africa Protectorate, Malindi or Melinde is historically interesting as that from which Vasco da Gama set sail for the coast of India in 1498, but the finest natural harbour on the coast, capacious and deep enough for the largest vessels, is at Port Kilindini, the ocean terminus of the Uganda railway, opposite Mombasa which is situated on a small island connected with the mainland by a bridge half-a-mile long. The railway just mentioned, running to Port Florence on Ugowe Bay, the easternmost arm of Lake Victoria Nyanza, was finished in December 1901. Uganda cultivates cacao, rubber, cotton, millet, maize, wheat and other cereals, sugar-cane, sisal, coco-nuts, and citrus fruits. Horned cattle, sheep, and goats are raised. Labour is plentiful and, although requiring training and supervision, is above the average. See also tables in the Appendix.

1213. The islands of Zanzibar and Pemba, forming the Kenya Protectorate, are almost the last relics of an Arab sultanate which once held sway over the whole of the neighbouring coast, and to which a strip of ten miles on the coast still nominally belongs, though actually under British administration. The town of Zanzibar, on the west side of the island of the same name, has long been the chief centre of the trade in this region—a trade largely in the hands of merchants belonging to British India (Baniyas). On February 1, 1892, the port of Zanzibar was declared free, all customs duties except those on ammunition and strong spirits being abolished. Cloves are the chief commercial product of the islands, especially of Pemba.

1214. Italian Somaliland extends from the Jub to the mouth of

the Gulf of Aden. On this coast lies the old Arab port of Mokdishu, Magadosho (in Portuguese spelling Magadoxo), or Madisha, now of little consequence. On the Gulf of Aden to the west is British Somaliland, with the ports of Berbera and Zeila, of which, by treaty in 1915, Britain granted Italy a large strip of territory on the right bank of the Juba, with the port of Kismayu. The fertile oasis of Harrar yields high grade coffee for export. A railway to Adis (or new) Harrar, situated at the base of the plateau below the oasis, from the French port of Jibuti at the mouth of the Gulf of Tajurra, 180 miles in length, was opened in 1916. A small tract all round this gulf belongs to the French, and French territory is succeeded to the North by the Italian colony or dependency of Eritrea, stretching to 18° 2′ N. and containing the ports of Assab and Massaua (Massowah).

1215. Abyssinia, a country composed of lofty tablelands, in which the chief towns are situated at the height of about 6,000 feet above sea-level, is of little or no value as regards European commerce. In the lower country the forests abound in valuable timber; the yellow pine is, however, almost the only variety that resists the attacks of the white ant. Its present capital is Adis Abeba, situated at the southern edge of the tableland of Shoa in about 9° N. The Italians once claimed a protectorate over it, but renounced this claim in 1896.

1216. Of the **African Islands,** by far the most valuable commercially at the present time are Mauritius (British) and Réunion (French). They are both covered with plantations of tropical products, of which sugar is the chief, the labourers being chiefly coolie immigrants (**110**). Mauritius annually exports more than 200,000 tons of sugar, chiefly to India, the Australian colonies, the United Kingdom, and the United States. Rum, vanilla, aloe fibre, and coco-nut oil are among its other exports. The Seychelles, a separate British colony since 1903, export coco-nuts and coco-nut oil, besides large quantities of vanilla and tortoise shell. Socotra, off the eastern extremity of Africa, an island annexed to the British Empire in 1886, is chiefly known in commerce for its aloes, although the species of *Aloë* which takes its name from the island is a native of South Africa (whence the drug is principally imported). The aloes derived from Socotra are probably obtained from *Aloë vulgaris* or some allied species.

1217. The large island of **Madagascar** exports rubber, cattle, hides, wax, and a few other products, but has a very small commerce compared with its population of three millions or thereabouts. Its mountainous but well-grassed and well-watered interior is admirably suited for cattle-rearing. Since 1885 the island has been a French protectorate, and since 1895 under direct French administration. Since the latter date preferential duties have been granted in favour of French goods, and in consequence the value of British exports to the island (previously between £100,000 and £200,000) has dwindled to insignificance. The capital is Antananarivo on the

plateau of Imérina in the interior, and its nearest port is Tamatave on the east coast. In the north-east of the island is the fine harbour of Diego Suarez, and on the west, nearly opposite Mozambique, Mojanga, at the mouth of the Betsiboka river. The Comoro Is. (French), north-west of Madagascar, furnish sugar, rice, and hides. The British islands of Ascension and St. Helena, in the South Atlantic, are now of little value commercially, though the latter was, before the opening of the Suez Canal, an important calling-station for the numerous vessels passing round the Cape of Good Hope. The Cape Verde Islands (Portuguese) are also of small commercial value, and are occasionally three years without any rain. The atmosphere is hazy, and thick towards the African coast, but St. Vincent has a magnificent harbour, which causes it to be used as a calling-station by Atlantic steamers.

1218. Among the African islands in the Atlantic are the Azores (Portuguese), which supply immense quantities of oranges (St. Michael) and pine-apples ; Madeira (Portuguese), which exports wine and fruit ; the Canaries (Spanish), which have for some time supplied the London market with large quantities of early vegetables and bananas ; St. Thomas and Principe (Portuguese), islands situated just north of the equator off the west coast, and having cacao,[1] cinchona, coffee, and other plantations. The aerial trade from Europe to America is to be via the Azores.

[1] In 1913, 43,500 metric tons of cacao were exported.

AMERICA

1219. America, or the New World, is less than one half of the aggregate size of the three great continents of the Old World—Europe, Asia, and Africa. Its population, numbering about 125 [1] millions, is estimated to be made up of the following elements :—people of European origin, about 58 per cent. ; native Indians, about 15 per cent. ; negroes, 13 per cent. ; people of mixed race, 13 per cent. ; Chinese, natives of India, &c., less than 1 per cent.

1220. The commerce of America taken as a whole has one striking feature, namely, the vastness of the scale on which it is carried on relatively to the density of the population. This arises from the mode in which America has been peopled, especially since the great improvements in the means of communication brought about in the course of the nineteenth century. The prevailing characteristic of the development of American resources is the rapid utilisation of cheap land by devoting it on a large scale to the production of the commodities for which, under existing conditions of commerce, it is best suited.

1221. In consequence of this there is a large preponderance of bulky articles (food-stuffs and raw materials) among the exports of the continent, and this makes it in general impossible to balance the outward with the inward trade as regards quantity. Large numbers of empty railway wagons have to be hauled to the producing regions of the interior. This is an inducement to the railway companies to reduce the inward rates of carriage to the lowest point, for it is obvious that in these circumstances anything earned over the cost of collecting, handling, and delivering the goods is a profit to them. In some cases, however, the conditions are reversed. The trade across the Rocky Mountains carried on by the Canadian Pacific Railway is larger inwards than outwards. Inwards are carried large quantities of lumber, shingles, and other forest products of the Pacific seaboard, besides such less bulky articles as sugar, tea, and other products of the Pacific islands and the Orient, while the heavy gradients of the Rockies tend to limit the outward trade in grain and cattle. This acts as an inducement to the company to stimulate that trade by low rates, especially for ocean carriage. The development of the Yukon has done much to promote a westward trade in oats, and low rates of railway

[1] This estimate referred to the year 1890. In 1920 the population was upwards of 200,000,000, and there can be no doubt that the proportion of the European element has increased and is still increasing.

freight are tending to create a large trade in flour even with the Orient.

1222. The situation of the American continent about midway between the most populous and productive parts of Europe on the one side, and Asia and Australia on the other side, is likewise noteworthy in relation to American commerce. The advantage of this position will become more apparent as population condenses on the west side of the continent. In the meantime, while the western market of America is comparatively small, such products as eastern Asia supplies are either obtained from other countries more favourably situated for the great eastern markets of America, or, in most cases, are imported by the longer, but unbroken, sea-route. Tea, for example, though imported into the United States almost exclusively from China and Japan, enters that country mainly by eastern ports. In 1886–87 less than one-tenth of the whole amount was introduced by way of San Francisco and other ports on the Pacific. The only important eastern products the greater portion of which is introduced into the United States by western ports are raw silk and rice. Raw silk is the most valuable of all these commodities in proportion to its bulk, and therefore best fitted to bear the cost of land-carriage. Rice, on the other hand, is largely consumed in California by the Chinese, who are mainly settled in that part of the country, and the eastern demand for rice is probably in a large measure supplied by the rice produced in the country (**1297**).

1223. In North America the shortest trans-continental line north of the Gulf of Mexico is in Canada. Till 1915 the only railway that had a through line there was the Canadian Pacific, particulars as to which are given in par. **1252**. The wheat of the North-West is the chief product carried eastwards by this route, and the arrangement of the long lakes Winnipeg, Manitoba, and Winnipegosis, west of the great lakes of the St. Lawrence, must force all the traffic from that region to the south of those lakes so long as there is not a sufficiently large body of settlers in more northerly latitudes to justify the laying of a railway running from west to east to the north of the lakes. The Lake of the Woods further east confines the traffic to the narrow belt between that lake and Lake Winnipeg, or forces it southwards into the territory of the United States through which the Canadian Northern Railway passes for a short distance. That is why most of the lines of the Canadian North-West converge on Winnipeg, and why that town is growing with such rapidity. (See the map opposite next page.)

1224. There are several routes from the eastern seaboard to the interior of North America which run partly through Canada and partly through the United States. The short line of the Canadian Pacific through Maine is described in Table II, p. 614. The Sault Ste. Marie-Minneapolis branch of the same railway is re-connected with the main line a little to the west of Regina by a line which re-enters

Canada at Portal, and which brings down vast quantities of Canadian wheat to be milled at Minneapolis. From Montreal to St. Paul (adjoining Minneapolis) by this route the distance is 1,119 miles, and to Vancouver 2,930 miles. By the Grand Trunk connection with Chicago (**1254**), effected by means of a tunnel under the St. Clair River between Sarnia and Port Huron, Montreal is 849 and Portland, Maine, 1,146 miles from Chicago. By another route New York is connected with Chicago by a line which passes over the Niagara River at Buffalo into Canada, and then re-enters the United States by Windsor and Detroit. Here the connection is also being made by means of a double railway tunnel under the Detroit River.

1225. The trans-continental lines which lie entirely within the United States have to cross both the Appalachian system and the Rocky Mountains, which necessitate great windings and steep gradients. In the east railways on both banks of the Hudson run northwards for more than 140 miles to take advantage of the same breach in that system, the Mohawk valley, as is made use of by the Erie Canal (**1282**) in proceeding westwards to Buffalo and Chicago. This deviation raises the distance between these two points to upwards of 980 miles. A shorter route, 912 miles [1] in length, connects the two places by way of Philadelphia (90 miles) and Pittsburgh (444 miles), but in one part this route has an average gradient of 1 in 60 for 11 miles, and has one curve so sharp that rails weighing 100 lbs. to the yard have been worn down to 82 lbs. in fourteen months. Windings and heavy gradients occur also on the routes between Boston and Buffalo, the windings being such that even on the route through the Hoosac Mountains (**1284**) the distance by Buffalo to Chicago is about 40 miles greater than that of the routes from New York through the same town.

1226. The termini both of the West Shore line running up the right bank of the Hudson and the line belonging to the Pennsylvania Railroad Company through Philadelphia to Chicago formerly had to be reached by ferry from New York, but a large terminal station has been constructed to the Pennsylvania Railroad Company in the heart of the city and tunnels have been pierced under the harbour to connect the city, including Brooklyn, with the New Jersey shore. These tunnels, however, serve only for passenger traffic.

1227. The connection of Chicago, and thus of the eastern seaboard, with San Francisco (or rather with Oakland on the east side of the Bay of San Francisco) by the completion of the Union and Central route (**1252**), through Des Moines and Omaha, was effected in 1869, and this was the first trans-continental connection north of the Isthmus of Panama. The total distance by this route between New York and San Francisco is 3,270 miles by the Philadelphia route, 3,338 miles by Buffalo. Denver, Colorado, 1,210 miles by rail from Chicago, is connected with the Union Pacific Railway at Ogden, east

[1] The same distance as that by rail between Chicago and New Orleans.

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of the Great Salt Lake, and by this route is 1,611 miles from San Francisco. Towards the end of 1909 a new trans-continental connection was established by the opening for freight traffic of the Western Pacific Railroad, the route of which is shown on the accompanying map. Though this line has easier gradients than the Central Pacific, it is considerably longer.

1228. The Northern Pacific and the Great Northern railways, whose routes are likewise shown on the map, both have for their eastern terminus St. Paul, 410 miles by rail north-west of Chicago. The distance by the Northern Pacific from St. Paul to Tacoma, on Puget Sound, is 1,912 miles, to Portland 2,056 miles, those from New York by Philadelphia 3,234 and 3,378 miles respectively. By the Great Northern Railway the distance of Seattle, on Puget Sound, from St. Paul is 1,823 miles, from New York 3,145 miles.

1229. The Atchison, Topeka, and Santa Fé railway and the Southern Pacific both establish connections with San Francisco by way of the southern half of the Californian valley. The former completes a trans-continental connection by way of St. Louis, where the Mississippi has been bridged since 1874. By the shortest railway connection with the Santa Fé system this city is 2,395 miles from San Francisco, while it is 1,063 miles from New York by way of Philadelphia, Pittsburgh, Columbus, and Indianapolis; but the shortest connection of St. Louis with the eastern seaboard is that with Baltimore, by Cincinnati, a distance of 920 miles. The Southern Pacific connects San Francisco with New Orleans (2,489 miles) and Galveston (2,183 miles). With regard to all the railways mentioned in this and the two preceding paragraphs see also Table I, par. **1252.**

1230. Only a comparatively small number of commodities are conveyed by these trans-continental lines from the western to the eastern seaboard. The only commodity imported in large quantity on the Pacific side for carriage to the Atlantic side is raw silk, the high value of which enables it to bear high transport charges. Great quantities of Californian fruit and of hops and apples from Oregon, Washington, and British Columbia are carried far eastward by rail and even for export to Europe; and very large timber of the kind of which British Columbia almost has the monopoly is carried by rail from Vancouver even to Halifax for shipbuilding. But the great bulk of the commodities conveyed over these lines are the products of the North-West east of the Rockies—living animals (mainly for the slaughter-houses of Chicago), grain to the lake-ports of Chicago, Duluth, Superior, and Fort William or for further transport eastwards by rail, and other agricultural products, besides ores and metals from mines in the mountains. Westwards are carried chiefly coal and manufactured goods. Before the opening of the Panama Canal (**1232**) considerable quantities of Hawaiian sugar were imported at San Francisco to be again despatched by sea at Galveston for eastern

ports, but this was exceptional. It is for this kind of traffic, however, that the Tehuantepec railway[1] (**1330**), the Panama railway, and the Panama Canal are designed. An important advantage of all these last connections between the Atlantic and Pacific is the fact that the great circle route from their Pacific termini to Japan and northern and middle China nearly follows the trend of the coast of North America as far as California, and even San Francisco is not very far out of such a direct course. On the Atlantic side again there is the advantage that from Bishop's Rock, Scilly Isles, at the entrance to the English Channel, the route is not greatly lengthened for the Atlantic termini of these land crossings by a call at one or other of the Virginian coaling ports of Norfolk or Newport News on Hampton Roads. The direct route from Bishop's Rock to Colon is 4,356 nautical miles; the route by Hampton Roads little more than 250 miles further.

1231. As yet the only transcontinental railway route in South America is that which connects Valparaiso in Chile with Buenos Aires, with a length from sea to sea of 883 miles, opened May 25, 1910. Between Los Andes on the Chilean side of the mountains and Mendoza on the Argentine side it passes beneath the Uspallata Pass in a tunnel nearly two miles long with a summit level of 10,469 feet. The mountain section of this railway, 153 miles in length, is on the metre gauge, the remainder on the Argentine standard gauge (5 ft. 6 in.).

1232. The opening of the Panama Canal in August 1914 (**1333**) brought about many changes in ocean routes, but it should be observed that by no possibility can it have such an important effect on the commerce of the world, and lead to such a rapid expansion of traffic, as was brought about by the opening of the Suez Canal. This latter canal greatly shortened all the voyages between the most important parts of the East and West, the West including the eastern seaboard of North America. In a minor but still important degree, it also shortened the distance from Australia to Europe. The table given on p. **761** shows, on the other hand, that the Panama Canal effects no shortening of distance between Europe and the East or Europe and Australia. It will not even make the distance from New York to Shanghai, that is, the Yangtse valley, shorter than that from Liverpool or London by the Suez Canal. It may also, I think, be taken as certain that the shortening of distance from New York to Shanghai by some six hundred miles will not suffice to divert all the traffic between these ports from the advantageous route by Suez. It

[1] Between January 26 and the end of 1907 225,000 tons of freight were carried eastwards by this railway and 125,000 tons westwards. The eastward bound traffic consisted mainly of Hawaiian sugar consigned to Philadelphia, but included 12,000 tons of canned salmon and Californian wine for New York. The freight in the opposite direction was general merchandise and structural iron for the Pacific states and the Hawaiian Islands, but the company is now (June 1908) about to begin handling freight between European ports and the west coast of North, Central and South America, and contemplates dealing with cargo between New York, New Orleans, and some parts of the far east.

is chiefly the western side of America that will be brought nearer to the Atlantic, and that side of America is, on the whole, far from productive in proportion to its length. By far the most productive parts of it are a few valleys in the United States. Elsewhere that seaboard is largely bordered by mountains rich at most in timber, by deserts, and by dense tropical jungle. It is true that even the deserts are not without commercial products, and nitrate of soda, the most important of these, furnishes the largest quota of the canal traffic, petroleum and coal coming next in order.[1]

[1] In 1919, the first complete year after the war, the gross tonnage that passed through the canal was 7·47 million tons, less than one-third of that which passed through the Suez Canal in 1914 (26·87 million tons).

NORTH AMERICA

1233. Including the West Indian Islands, this division of the New World comprises more than half the area and nearly three-fourths of the population belonging to the whole.

The **surface** is made up mainly of plains and tablelands, and the great mountain chains have a more or less southerly trend. In the west a series of lofty mountains stretch through the entire length of the continent, rising from a tableland, 4,000 feet or more in height, which at its widest (about lat. 40°) extends over fully one-third of the breadth of the United States, and east of the mountains slopes very gently downwards to a great plain. The mountain chain which rises above this tableland in the east is the Rocky Mountains, in the stricter application of that name. But this name is also applied more generally to include a great number of shorter mountain ranges, which vary the surface of the tableland, and nearly all of which trend north and south, or in a direction which does not greatly deviate from that. The Cascade Mountains and the Sierra Nevada are the principal mountain chains that border the tableland in the west, in the wider part of the continent; and still further west are lower mountains, known as the Coast Range. Towards the south, in the narrower part of the continent, the tableland stretches almost from sea to sea. Several railways now cross these mountains. Those in the middle part of the system, where the traffic is most active, do so at passes varying from about 5,300 to upwards of 8,000 feet in height (**1252**). The only other great mountain system of North America is that of the Appalachians or Alleghany Mountains, which extend in long parallel chains in the same general direction as the Atlantic coast.

1234. A chain of magnificent lakes, Lakes Superior, Michigan, Huron, Erie, and Ontario, is drained by the St. Lawrence into the Atlantic, and together with that river form an invaluable means of internal communication, and the great rivers of the plain are likewise of the highest service in this respect.

1235. The general correspondence between the **climate** of the west of North America and that of western Europe, and between the climate of the eastern side of the continent and that of eastern Asia, has been referred to in the paragraphs relating to climate generally (**55, 56**). Here two features in that correspondence may be recalled to mind—first, the more equable climate of the temperate zone in the west

than in the east, and secondly, the dearth of rain in the west, south of the parallel of 37° or 38° N. (**66**) ; and it is only necessary to add some particulars regarding the effect on the climate of the continent of some of the great physical features. (See the diagrams at p. 607.)

1236. Important climatic effects are due to the direction of the mountain chains. The western mountains, shutting off the moisture from the Pacific, cause a large part of the interior of the United States to be too dry for agriculture without irrigation. It is mainly from this cause that the greater part of the area of the United States west of 100° W., with the exception of a portion of the maritime strip, has this arid character (**64**). Further, the open plains and gently rising ground between these mountains and the Appalachians allow even the most southerly points of the United States, as well as the east coast of Mexico, to be swept from time to time by keen winds from the north, so that ice forms at the mouth of the Mississippi in lat. 30° N. ; and even in the extreme south of Texas (lat. 26° N., about the same latitude as Patna in Bengal) as much as 14° of frost has been experienced. In the winter of 1885-86 a severe frost seriously injured a large proportion of the trees in the orange-groves of Florida, and the recurrence of frosts extinguished for a time orange-growing in all the Gulf states. Even below St. Louis (38½° N.) the Mississippi navigation (**1276**) was partly closed by ice for 33⅓ days on the average of the twenty-three years 1865–66 to 1887–88. (Comp. **58, 455.**)

1237. Other important effects on the climate are due to the great gulfs in the north and south, Hudson's Bay and the Gulf of Mexico, as well as to the great lakes, the aggregate area of which is larger than that of Great Britain. Besides exercising through the agency of winds an equalising effect on the temperature, they are all sources of moisture, especially during the summer months, when moisture is most needed. It is in a large measure from this cause that north and east of the arid region of the continent the plains are supplied with rain enough at least for the growth of pasture grasses and other herbage. These plains form the prairies of North America. They are for the most part treeless, except near the river banks, but experiments have shown that it is possible to extend the area of forests in this region, and in some places steady efforts are being made to do so.

1238. Notwithstanding the great extent of the arid lands in the western half of the broader region of the continent, there is, according to Woeikof, the celebrated Russian meteorologist, no other part of the earth with a considerable rainfall during the summer months over so great an extent of territory in middle latitudes ; and this circumstance explains in a great measure the success with which such crops as maize, sorghum, and cotton are here cultivated over such wide areas.

1239. For a long period after the discovery of America, the only important commodities furnished by North America were the precious

metals derived from the West Indies and Mexico and cod from the Great Banks of Newfoundland (**500**). The West Indies and Mexico were entirely in Spanish hands. The feeble Indians of the islands were easily subjected at the time of their discovery in 1492 and the years immediately following, and the Aztec empire in Mexico was overthrown by Cortez in 1519–21. The mines of the precious metals in the West Indies were soon exhausted, but those of Mexico have never ceased to be extremely productive (**953**). Though the first English voyage to America, that which set sail from Bristol under the Venetian, John Cabot, in search of a north-west passage to India, was made in 1497, and though it was in virtue of that voyage that the English afterwards laid claim to a great part of the coast of North America, the first settlements in the temperate latitudes of that continent were made by the French. The banks of the St. Lawrence were explored by Jacques Cartier in 1533–43; but the most successful French settlements were due to the efforts of Samuel Champlain (1602–35). He founded Quebec in 1608, and a few years after his death Montreal was founded in 1642. French explorations and a few isolated French settlements were made higher up, but the rapids above Montreal put a limit to continuous settlement by the French. All the territory on both banks of the St. Lawrence below Montreal continued to be French till the capture of Quebec by General Wolfe in 1759. Meantime settlements were made by other countries elsewhere. The first attempted settlement of the English was a failure. It was made on Roanoke Island in Pamlico Sound at the suggestion of Sir Walter Raleigh in 1585, but the survivors of the settlement were brought back to England by Sir Francis Drake in 1586. The first successful English settlement, known as Jamestown, was made in 1607 on a promontory of the James River, at the mouth of Chesapeake Bay. This former promontory is now an island in the river, on which the relics of this settlement are carefully preserved by the government of the United States. The next English settlements were made in Massachusetts—at Plymouth in 1620, and on Massachusetts Bay in 1628–30. In 1612 the Dutch began to trade at the mouth of the Hudson, a river ascended by the English navigator of that name when in Dutch service (1609), and in 1623 the first regular colony was founded by the Dutch West India Company on Manhattan Island. This formed the nucleus of New Amsterdam, whose name was changed to New York when it was taken by the English in 1664. Forest produce, hemp, and in the southern settlements tobacco, formed the principal articles of export trade among these communities. Early in the seventeenth century, however, furs began to reach Europe from Hudson's Bay, and in 1670 this trade became a monopoly of the English Hudson's Bay Company (**487**). Sugar, coffee, and cotton gradually came to be important products of the West Indies, but it was not till after the severance of the English colonies from the mother country in the war of independence (1776–83) that cotton came to

be extensively cultivated on the mainland (**366-368**). But the great commercial development of North America is that which has followed the introduction of steamships and railways. By that means bulky produce of the far interior, such as grain and provisions, could for the first time be conveyed to Europe at a sufficiently low cost to allow of the growth of an immense trade in these commodities.

COUNTRIES OF NORTH AMERICA

GREENLAND

1240. Greenland is a large mass of land, or group of islands (it is uncertain which), almost wholly buried under ice. The few settlements on the west coast, inhabited chiefly by Eskimo under Danish rule, are of no importance in commerce, except as being sometimes visited by whalers (**494**) and as a source of cryolite (**571·9**).

BRITISH AMERICA

A. THE DOMINION OF CANADA

1241. Canada is situated to the north of the United States, from which it is separated partly by the middle line of Lakes Superior, Huron, Erie, and Ontario, partly (west of the Lake of the Woods) by the parallel of 49° N. The inhabitants are mainly of British origin and Protestant in religion; but French Roman Catholics make up about one-third of the population, chiefly in Quebec, where the first colonists were French (**1239**). There are about 120,000 Indians, most of whom are hunters, roaming over the forest regions of the North-west, and living by the sale of furs to the fur-trading companies. The islands of the Arctic Archipelago are of interest in the history of commerce, from the fact that a north-west passage to eastern Asia was for centuries sought in vain among the channels that separate them. A passage was at last effected by Maclure in 1850–53, but the route is too much encumbered by ice to be of any use commercially.

1242. The Dominion, formed in 1867, by the union of separate colonies, has a general government and parliament for the common affairs, but it has nine provinces (some of which correspond with old colonies) with separate parliaments, empowered to deal with matters of local concern. These provinces are Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. In addition to these there is a vast

territory on both sides of Hudson's Bay, not yet so organised. The seat of the general government is Ottawa, in the province of Ontario (**1264**). With the view of encouraging immigration, the government of the Dominion gives a free grant of 160 acres of land (subject to a small fee for registration) to settlers who undertake to reside on the land and prepare it for cultivation.

1243. The **extent** of the Dominion territory is upwards of three millions of square miles, but the more populous portion of this vast area is confined to the region south of the St. Lawrence west of the city of Quebec, and the land on the north adjacent to that river and to the great lakes from Quebec to the eastern shores of Lake Huron. The whole of the more populous area lies at least two degrees further south than the southernmost point of England, but from two to six degrees further north than southern Manchuria, which may be considered the corresponding region of Asia (**1118**).

1244. The **surface** east of the Rocky Mountains is made up principally of plains and undulating lowlands. Tundras, similar to those of northern Russia and Siberia (**910, 1009**), cover large tracts in the north, descending in the east to about 58° N. on the western shore of Hudson's Bay, and still further east extending along the whole coast of Labrador. There next follows a range of vast forests, chiefly of pines and firs, a region that embraces the whole of the Dominion east of Lake Winnipeg, except the tundra area and the limited portions cleared for agriculture. In the west of the Dominion, this region is succeeded to the south by the prairies, which extend furthest north on the gently sloping tablelands immediately to the east of the Rocky Mountains. The nearly treeless prairies here extend about 3½ degrees north of the United States frontier, and the area with less than 20 per cent. of forest land reaches about 10 degrees north of that frontier, between the Rocky Mountains and Lake Athabasca. For the future development of the Canadian Dominion this prairie region is of the highest importance, for it contains vast areas ready for the plough, with soil of the richest description, and a climate admirably adapted for agriculture, though very different from that of England. In this prairie region there is a rise on the whole from east to west, and this rise takes place in such a manner as to form what are known as the three prairie steps. The lowest level in this region is that of the Red River Valley, between 700 and 800 feet. West of that valley the surface rises to about 1,500 feet, and this terrace stretches westwards for about 250 miles. The ground then rises to about 2,000 feet, and then the rise is more gradual to the foot-hills of the Rocky Mountains.

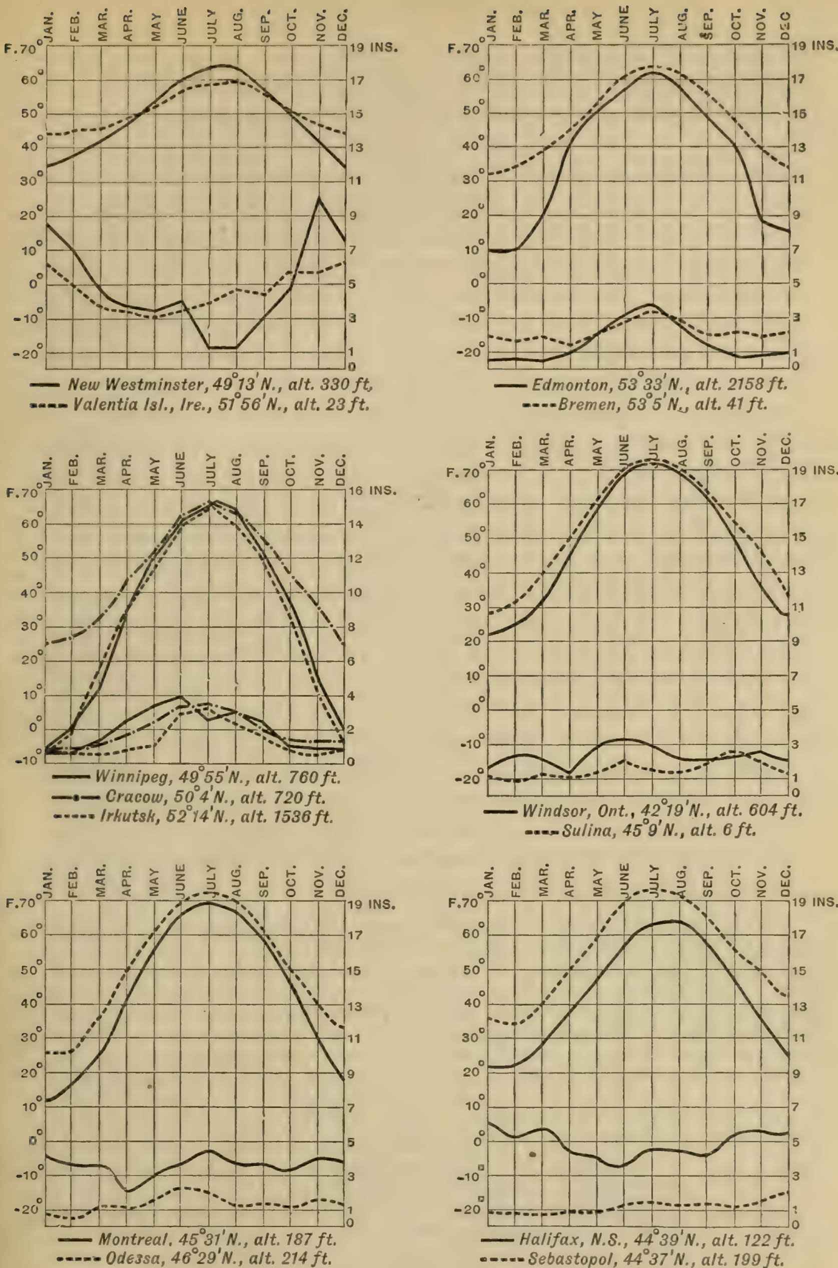
1245. In the eastern half of the Dominion, the **geological structure** is of peculiar geographical importance. It is of such a nature as must for ever forbid extensive settlement. From the banks of the St. Lawrence, some little distance below Quebec to the Red River valley, there extends an enormous region of ancient crystalline rocks, protruding in

many places in naked masses, in other places having only a thin covering of soil supporting forests of fir and pine. The principal exception to this character is the area already referred to as the most populous of the Dominion, but there are also many larger or smaller isolated valleys with a deep and fertile soil, which will no doubt some day be the seats of prosperous though scattered communities.

1246. The general similarity between the climate of North America and that of corresponding latitudes in Europe and Asia is noticed in par. **1235,** but some details are of importance (see the accompanying diagrams). East of the Rocky Mountains the **climate** of the Dominion generally is characterised by those extremes of temperature which prevail in the same latitudes in the northern hemisphere everywhere, except in regions exposed to south-westerly winds from the ocean. But an important difference between western Canada and Europe is due to the fact that the whole area between the Rocky Mountains and the Pacific coast is mountainous, and that the mountains run throughout parallel to the coast and nearly at right angles to the prevailing winds. Hence great contrasts, both in respect of rainfall and temperature, begin within a short distance of the Pacific. At New Westminster, at the mouth of the Fraser, the mean temperature of the coldest month of the year is 36° F., of the hottest about 58° F., and the total precipitation[1] 65 inches; at Lillooet, higher up the Fraser valley but behind the Coast Range, the corresponding figures for temperature are 22° F. and 68° F., for rain- and snow-fall about 13 inches. To the east of the Rocky Mountains the total precipitation is very scanty, though it begins to increase again in eastern Saskatchewan.[2] But as the future development of the Canadian north-west must depend to a large extent on the cultivation of European grains, and more particularly of wheat, two counter-considerations affecting this industry must be borne in mind. First, it is important that the great bulk of the total precipitation takes place during the summer months. (See par. **67** and the diagrams opposite). Second, throughout the Dominion of Canada a considerable proportion of the precipitation takes place in the form of **snow,** the amount of which, however, is much greater in the east than in the west. At Montreal the average of the fifteen years previous to 1885 was nearly 120 inches; at Toronto, the average of forty-four years, 70 inches; and even in 42° S., in the extreme south of Ontario, the same latitude as the northern frontier of Portugal, in a district in which grapes are grown for wine-making in summer, the average of fourteen years was 57 inches. At Winnipeg, in Manitoba, the average of the same period was only 50 inches. Two advantages

[1] Including both rain and snow. The meteorological office of Canada reckons ten inches of snow as equal to one inch of rain (of course only a very rough average).

[2] At seven stations in the prairie provinces for which a twenty years' average (1888–1907) can be given, the average varied from 14 to 21 inches. At Battleford in 108° 20′ W. it was 14, at Qu'appelle in about 104° W. it was 19, and at Winnipeg (alt. 760 feet) in 97° 10′ W., 21 inches.



COMPARISON OF METEOROLOGICAL DATA, CANADA, EUROPE AND SIBERIA. Mean temperature curves above, rainfall below.

Degrees F. numbered on left, inches of rainfall on right.
Canadian curves continuous, European or Asiatic dotted or broken lines.

for wheat-growing accrue from this snowfall, one experienced principally in the eastern half of the Dominion, the other in the west. In the east the total precipitation is ample, and is fairly equally distributed throughout the year, and there the great advantage of the snow as regards wheat-culture is that it protects the ground against the severe frosts. There accordingly winter wheat (or, as it is called in America, fall wheat) can be regularly grown, whereas in Manitoba and the north-west the frost comes before the snow, and hence only spring wheat can be cultivated. But in this part of Canada it is important that the melting in spring of water frozen underground furnishes moisture just when it is wanted. In the more arid parts of the north-west, however, **irrigation** is necessary. Irrigation is as yet confined to small areas in the southern parts of Saskatchewan and Alberta. In these provinces the work is under the supervision of the Dominion Government, although the actual irrigation plants are being constructed and operated by private companies.[1] But in those parts in which wheat is most largely grown, it is not the total amount of the annual rainfall that determines the amount of the produce.[2] The chief disadvantage of the Canadian climate for wheat-growing, and especially in the north-west, is the liability to the occurrence of **frost** before harvest, but this risk is being greatly reduced by the careful selection of seed and the cultivation of hardy varieties of wheat, which ripen quickly, and, as it happens, yield hard wheats of exceptionally high value. The correspondence between the temperatures of Canada and those of Asia is indicated in par. **1009**, but it must be remembered that the summers that follow the cold but dry, invigorating, healthy, and pleasant winters are remarkably bright as well as warm. 'The whole of Canada, with the exception of near the coast in British Columbia, is favoured with more sunshine than any portion of Great

[1] In the extreme south-west of Alberta the Canadian North-west Irrigation Company has constructed over 100 miles of irrigation canals, embracing an area of over 500,000 acres. A scheme to irrigate about 1,500,000 acres spread over an area of about double that extent east of Calgary has been carried out by the Canadian Pacific Railway Company. Ditches irrigate each of the 160-acre sections into which the block is divided, though not in every case wholly. The irrigated lands are suited to lucerne (alfalfa), field peas, and other fodder crops, sugar-beet, barley, &c., while winter wheat can be grown on the land above the canal system. Another and a larger scheme to irrigate about 3,000,000 acres is being carried out by the same company on the Bow R., about 113° W., and at the present time (1921) there is sufficient water to supply the needs of one half of the estimated tract. The Alberta Railway and Irrigation Company has been granted supplies from the Belly, Milk, and St. Mary Rivers. The Southern Alberta Land Company obtains water from the Bow and South Saskatchewan Rivers, and its subsidiary company, the Alberta Land Company, has been granted a small supply from the Bow River.

[2] Between 1883 and 1901, the average precipitation in Manitoba varied from 12 to 22½ inches and the average yield of wheat per acre between 9 and 28 bushels, but there was no marked correspondence between the rainfall and the yield. Data are not yet available for a long enough period to establish any relation between the wheat-yield and the seasonal distribution of the rainfall, but the experience of farmers and such data as exist point to the peculiar importance of the rains of May and June for the north-west. (See the rainfall diagram for Winnipeg, page 607.)

Britain, Germany, Holland, or northern France,'[1] In winter the temperature in districts adjacent to the great mountain ranges is greatly mitigated by warm, dry, or moist winds, from the south-east, south or south-west, west of the Rocky Mountains, and from the south-west, west or north-west to the east of the Rocky Mountains, those in the latter case being such as are experienced in all parts of the world on the lee-side of mountains exposed on the weather-side to copious rains. In Canada they are known as chinook winds. In southern Alberta they cause the cold of winter to alternate with spells of bright warm weather, in which the ground is swept bare of snow and the pasture grasses are revived, and they thus make the rearing of live-stock the characteristic industry of this part of the north-west.

1247. With regard to the **internal communications** of the Dominion, it is noteworthy, in the first place, that the St. Lawrence River and the great lakes, supplemented by a number of short canals (the longest is about 27 miles), form a system of internal navigation for sea-going vessels unparalleled in any other continent.[2] The first of these canals to be constructed was the Lachine Canal immediately above Montreal, opened in 1825, and other canals between Montreal and Lake Ontario were completed by 1843. The Welland Canal, which runs parallel to the Niagara River and avoids the Falls of Niagara between Lakes Erie and Ontario, and is the longest, was constructed in 1824–29. It has 26 locks with a total rise of 326¾ feet.[3] The shortest, but perhaps the most important, is the Sault Ste. Marie ('Soo') Canal between Lakes Superior and Huron, which was constructed between 1889 and 1895.[4] It is little more than a mile in length, and has only one lock,

[1] R. F. Stupart, in an article on the Canadian climate in *Symons's Meteorological Mag.*, vol. xxxviii., p. 32.

[2] In 1920 the Deep Waterways Convention decided to reconstruct the St. Lawrence River with locks, so as to supply navigation facilities equal to those of the Welland Canal. They also decided upon the public ownership of all water power available on Canadian waterways (652). A revised estimate of the available and developed water-power in Canada published in 1921 showed for the entire Dominion 18·26 million horse power, calculated on the basis of 24-hour utilization at 80 per cent. efficiency at the ordinary minimum flow, and 32·08 million, to be relied on for half the year, at the estimated maximum development. The actual turbine installation at that date was 2·47 million horse power (of which 1·03 in Ontario, 0·93 in Quebec).

[3] Its reconstruction on a large scale was begun in 1913 at an estimated cost of £1,000,000. It is to have a minimum width at bottom of 200 feet, and a minimum depth of 25 feet. The difference of 325 feet in the level of the two lakes is to be overcome by seven locks, 800 feet by 80 feet. When completed, vessels of 15,000 tons will be able to go from Lake Superior to Montreal.

[4] Since 1855 there has been a canal on the United States side at the same place, and on this side there are now additional locks, the largest of which has a depth on the sill of 25 feet. The traffic through these canals is now the greatest canal traffic in the world—much greater than that through the Suez Canal. In 1855 the registered tonnage that passed through the United States Canal was little more than 100,000 tons; in 1875, above 1,000,000 tons; in 1890, above 9,000,000 tons. The actual freight carried in 1913 was 42·7 million tons, of which close upon five millions passed through the Canadian lock. In 1915 the total tonnage through the locks was only 7·75 million tons, and in 1918, 12·9.

measuring 900 by 60 feet, with a depth on the sill of 20·3 feet at the lowest known water-level. Since 1899 all the other canals on the route have had a minimum depth of 14 feet.

1248. By this series of **waterways,** sea-going ships[1] may be carried up a distance of 2,250 miles from the straits of Belle Isle, in the north of Newfoundland, to Fort William on Lake Superior, and within about 1,908 miles by rail from Vancouver, the seaport at the Pacific terminus of that railway. On the United States side they are carried up a distance of 2,400 miles to Duluth, at the very head of Lake Superior, which is now within 1,890 miles by rail of the nearest Pacific port. An important project for shortening this route by the construction of what is called the Ottawa and Georgian Bay Canal, a water-way running on the whole nearly due west from Montreal (see map facing p. 596), by deepening the Ottawa, connecting it with Lake Nipissing and this lake with Lake Huron is now under consideration. The estimated reduction of distance to places on Lake Superior and Lake Michigan would amount to 340 miles. As recommended by a committee of the Dominion Parliament this waterway will have a total length from Montreal to Georgian Bay (Lake Huron) of 425 miles, of which 44 miles will be entirely artificial, 74 miles improved river navigation, and the remainder, 307 miles, will consist of river and lake needing no improvement to admit of its being navigated by vessels of 20-feet draught. The proposed canal depth is 22 feet. The northerly situation of this canal will, however, give it a very short season, after harvest, free from ice.

1249. The St. Lawrence navigation is usually open from about the end of April to near the end of November, or even the first week in December. The route from the mouth of the St. Lawrence, round the north of Newfoundland (by the straits of Belle Isle), is closed for a longer period than that by Cabot Strait, round the south of Newfoundland, which adds about 160 miles to the distance to Liverpool. Another drawback arises from the force of the current of the St. Lawrence and the liability to fogs, especially at the mouth of that river—circumstances which combine to render the navigation somewhat dangerous.[2]

1250. Besides this leading highway for ships, the Canadian Dominion possesses other less important inland waterways. The river Ottawa is continuously navigable, with the aid of a few canals, as far as the city of Ottawa ; and from thence there is a navigable connection by

[1] This, however, is not generally found to be economical. It is more advantageous to have special ships built for the lake and canal traffic.

[2] With a view to extend the Great Lakes navigation, so as to develop a bigger export of grain through Dominion channels, ice-breakers are now available where they are required—Port Arthur, Fort William, the Sault Ste. Marie Canal, and elsewhere. All the lights on Lake Superior, Lake Huron, Georgian Bay, Lake Erie, and Lake Ontario are now kept in operation until the end of December, or later, if possible.

Ottawa (1921) . . . 110,000

the Rideau River and Canal with Kingston on Lake Ontario. The Trent Valley Canal, opened in 1918, provides a waterway, for the most part natural, 7½ feet deep, between the Bay of Quinte, Lake Ontario, and the south end of Georgian Bay.

1251. Above Lake Superior, navigation can be continued with little interruption by Rainy Lake and River, Winnipeg Lake and River, and the North Saskatchewan River to near the base of the Rocky Mountains. The Assiniboine and Red River, which both belong, like

TABLE I

Railways across Rocky Mountains and Pacific Coast Ranges

Railway	Height in feet of Summits	Maximum Gradient expressed as percentage of Rise for a Given Length		Total Ascent overcome		Date of Completion
		West-bound	East-bound	West-bound	East-bound	
				Feet	Feet	
Canadian Pacific	5,344	1·2	2·2	23,051	23,106	1885
Grand Trunk Pacific	3,712	0·5	0·4	6,890	6,990	1914
Canadian Northern	3,700	0·5	0·4	—	—	1915
Great Northern	5,202	2·2	2·2	15,305	15,987	1897
Northern Pacific	5,569	2·2	2·2	17,137	17,830	1883
Chicago, Milwaukee, and Puget Sound	6,350	0·3	0·3	—	—	1909
Union and Central Pacific	8,247	2·0	2·2	17,552	18,575	1869
Union Pacific and Oregon	8,247	2·2	2·0	17,171	18,171	1884
Santa Fé	7,510	3·5	3·3	34,506	34,003	1883
Denver and Rio Grande	10,239	1·4	2·3	—	—	1871
Western Pacific	5,712	1·0	1·0	5,076	9,385	1909
Southern Pacific	4,610	2·0	2·0	8,150	11,852	1883
San Pedro, Los Angeles, and Salt Lake	6,060	1·6	3·0	11,307	15,528	1905

the Saskatchewan, to the basin of Lake Winnipeg, are likewise navigable, but the Nelson, the outlet of Lake Winnipeg to Hudson's Bay, is too much obstructed by rapids to be of great service as a waterway.

1252. In the more populous parts of the Dominion there is a tolerably complete network of **railways,** and since November 1885, when the Canadian Pacific Railway was completed, there has been uninterrupted railway communication from ocean to ocean within Dominion territory. The above table and the table on p. 614 exhibit some of the more important elements in the comparison of this railway, as a transcontinental means of communication, with the chief transcontinental routes of the United States. It will be observed from Table I. that the Canadian Pacific has an advantage over both its older rivals, the Northern Pacific

and the Union and Central, in the lower height of its passes, and the shorter length of route at high levels. The Great Northern Railway, the main line of which was completed in 1893. has, however, as favourable a route on the whole as that of the Canadian Pacific. The Canadian Northern Railway, which grew from nothing in 1896, is now the second railway system of Canada. It extends from ocean to ocean, and is now operating trains between Quebec and Montreal in the east and Winnipeg, Edmonton, and Vancouver in the west. It began in the west, running from Port Arthur south to the Lake of the Woods. Its development has been rapid. In the north-east it runs from Quebec by Montreal and Ontario by a route nearly parallel to the Canadian Pacific Railway, then south of Lake Nipissing to Key Harbour in the extreme north-east of Georgian Bay, and then further west, north of the Canadian Pacific Railway, but still south of Nipigon to Port Arthur.[1] With much government assistance this railway has for many years, like the Canadian Pacific Railway, been ramifying over the prairie provinces. It reached Edmonton in 1909, and by 1915 completed through the Yellowhead Pass to Vancouver, whence there is now train-ferry to Victoria, V.I. The company has, however, been in financial difficulties for some years, and like the Grand Trunk Railway has passed under government ownership and operation.

1253. On the eastern side of the Rocky Mountains the ascent of the main line of the Canadian Pacific Railway to the summit was always comparatively easy. A gradient exceeding 1 in 100 occurred over only about half a mile. But soon after passing the summit on the west side a very rapid descent took place. There was a drop of 1,150 feet in seven and a-half miles, involving gradients rising at one place to 1 in 22, so that the speed in descending had to be reduced to an average of less than ten miles an hour—at one place only five miles an hour. This dangerous piece of railway was successfully operated for twenty-four years without an accident to a passenger train, but the increasing traffic, involving heavier trains, at last rendered the reduction of the gradient a necessity. This was effected in 1909 by making the line double on itself and by piercing two spiral tunnels through mountains on opposite sides of the Kicking Horse River. Further west, where in crossing the Selkirks the line had to be protected against repeated avalanches by snow-sheds costly to maintain, a tunnel through that range five miles long was opened in December 1916. Further south another line of the same railway crosses the Rocky Mountains in the Crow's Nest Pass at an altitude of 4,453 feet.

1254. All the railways of Canada, like most of those of North America generally, are on the same gauge as our own—4 feet 8½ inches. The majority of the railways are in the hands of private companies, but the government now owns a large mileage of important railway

[1] Surveyors of the Ontario government have reported 16 million acres of cultivable clay land on this route—equal to about four-fifths of the area of the arable land of the United Kingdom.

lines.[1] By amalgamations most of the private railways were brought under the control of two great companies, the Grand Trunk Railway, the older of the two, and the Canadian Pacific. The most important line of the Grand Trunk system is that connecting Montreal on the one side with the south-west of the peninsula between Lakes Huron and Erie, there communicating with the shortest line in the United States to Chicago, the great lake-port at the head of Lake Michigan, and on the other side, after crossing the St. Lawrence by a bridge nearly two miles in length (including approaches), proceeds to the United States seaport of Portland (Maine). The other is the line which connects the Canadian Pacific Railway at Sudbury with Minneapolis in the United States by way of Sault Ste. Marie, and thus affords the shortest route from one of the most important wheat and timber regions of the United States, not only to the eastern seaports of Montreal and Quebec, but also to the north-east of the United States, including the port of New York. Within the United States the connection is established by the Minneapolis, St. Paul, and Sault Ste. Marie railroad, which about the end of the nineteenth century was brought into connection with the Canadian Pacific Railway by another line running north-west through the coal-mining town of Estevan to Pasqua west of Regina in eastern Assiniboia. A railway from Sault Ste. Marie to Duluth was completed in 1888. In 1903 the Dominion government entered into a contract with the Grand Trunk Railway Company for the construction of a new transcontinental railway from Prince Rupert, on the Pacific coast, to Moncton, in New Brunswick. The eastern direction of this line from Moncton to Winnipeg was constructed by the government, and crosses the St. Lawrence near Quebec by a cantilever bridge, the main span of which is the longest in the world, being nearly 1,800 feet from centre to centre of piers, or 100 feet longer than that of the Forth Bridge in Scotland. The easy gradients (**1252**) facilitate the carriage of grain to the Pacific, and this together with the short voyage to the Orient (**1267**) will aid the Canadian north-west in competing with rivals elsewhere in the supply of grain to the future industrial region of northern China.

1255. The construction of a railway from the rapidly developing grain-growing province of Manitoba (**1265**) to Port Nelson, on Hudson's Bay at the mouth of the Nelson River, was begun in 1911.[2] The

[1] In 1906 there were 1,713 miles of government, against 20,454 miles of private railways, inclusive of electric street railways. In 1919 the mileage was 38,896, of which the government owns and operates 13,598 miles. The government is now (1921) acting as receiver for the Grand Trunk Pacific Railway, with 2,714 miles of road. The Grand Trunk system is being appraised with the object of being taken over by the government. The mileage is 3,567. The Dominion government already operates 42 per cent. of the mileage of Canada, and with the Grand Trunk the mileage would be over 51 per cent. The electric railways have increased very rapidly since 1894. In 1919 the mileage was 1,696.

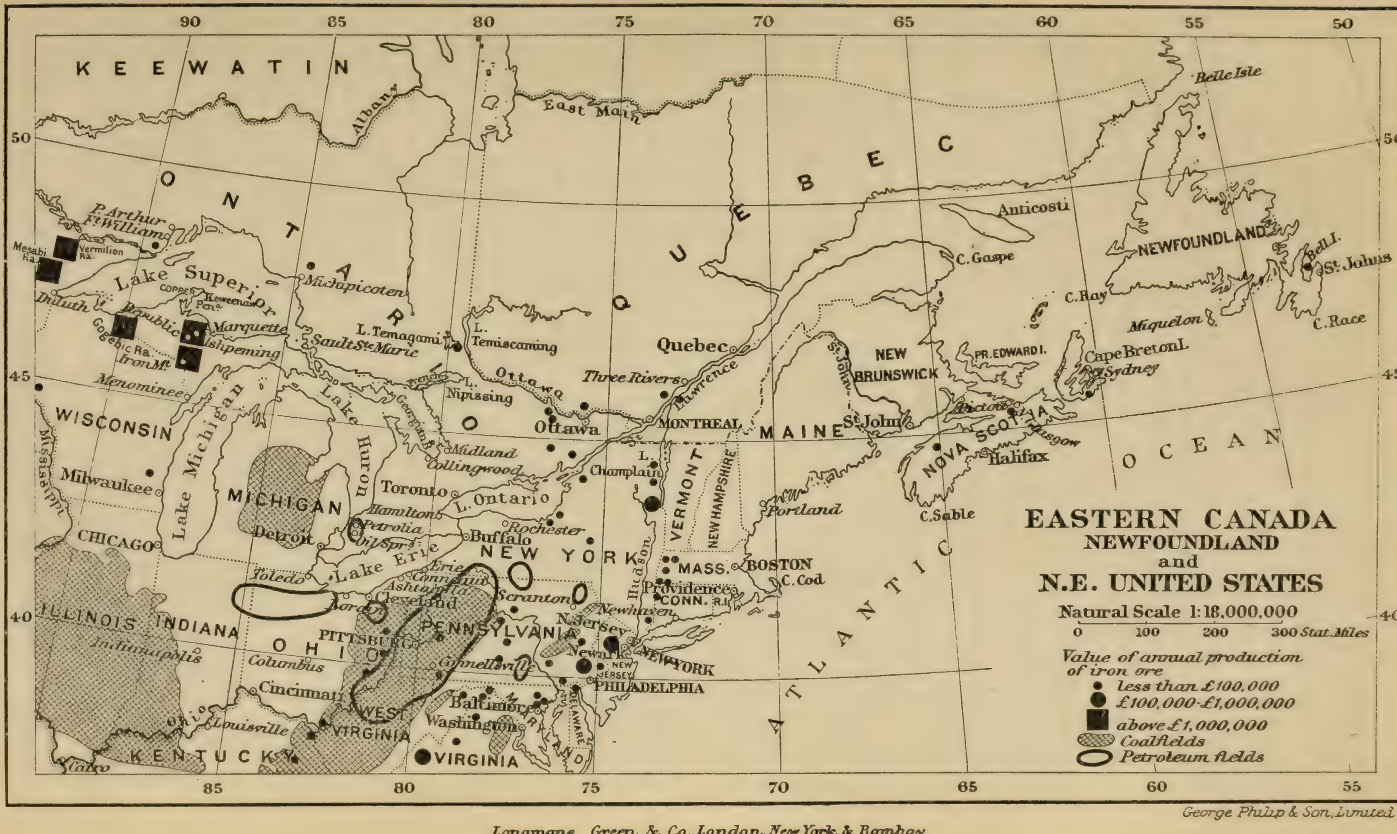
[2] The entire line has been graded and the track laid from Pas north to the second crossing of the Nelson River at Kettle Rapids (334 miles). Considerable progress has also been made on railway terminals and harbour works at Port Nelson.

TABLE II

Railway	From	Length in Statute Miles		Length in Nautical Miles from respective Pacific or Atlantic Ports to			Total Ocean Route Liverpool to Hong Kong
				Yokohama	Hong Kong	Liverpool	
C.P.R.	Vancouver [1]	To Port Arthur 1,915	To Montreal . 2,908	4,330	5,890	2,800	8,690
C.P.R.	,, By Intercolonial Railway .	. . . .	,, Halifax . 3,742	,,	,,	2,480	8,370
C.P.R.	,, ,, Short Line [2]. . .	. . . .	,, ,, . 3,595	,,	,,	,,	,,
C.P.R.	,, ,, Intercolonial Railway .	. . . .	,, Louisburg 3,910	,,	,,	2,240	8,130
C.P.R.	,, ,, Short Line . . .	. . . .	,, ,, . 3,780	,,	,,	,,	,,
C.P.R.	,, ,, Shortest connections .	. . . .	,, New York 3,162	,,	,,	3,030	8,920
N.P.R.	Puget Sound, New Tacoma ,, . .	To Duluth 1,915	,, ,, . 3,251	,,	,,	,,	,,
N.P.R.	Portland, Oregon ,, ,, . .	,, ,, 1,890	,, ,, . 3,235	4,250	5,810	,,	8,840
U. & S.	San Francisco ,, ,, . .	,, Chicago 2,356	,, ,, . 3,270	4,510	6,070	,,	9,100

[1] Under an agreement between the Imperial Government and the Government of the Canadian Dominion, a permanent line of first-class steamships, suitable for service as armed cruisers, now plies between Vancouver and Hong Kong by Yokohama. The first mails by this new route were delivered in London on May 13, 1891—25 days after leaving Yokohama, 32 days after leaving Shanghai, notwithstanding a delay of three days at New York.

[2] The Intercolonial Railway keeps close to the south bank of the St. Lawrence from Point Levis opposite Quebec to about longitude 68° W., and runs entirely through British territory; the 'Short Line' (opened on June 3, 1889) is the shortest practicable route from Montreal to the Ports of New Brunswick and Nova Scotia, and runs partly through United States territory.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and
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Petroleum fields
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QUEBEC
NEWFOUNDLAND
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VERMONT
NEW HAMPSHIRE
MASS.
CONN.
R.I.
NEW YORK
PENNSYLVANIA
NEW JERSEY
DELAWARE
MARYLAND
VIRGINIA
WEST VIRGINIA
OHIO
INDIANA
ILLINOIS
KENTUCKY
MICHIGAN
WISCONSIN
ATLANTIC OCEAN
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
L. Ontario
Anticosti
Belle Isle
Bell I.
St. Johns
C. Race
C. Ray
Miquelon
Cape Breton I.
Sydney
PR. EDWARD I.
C. Gaspe
Halifax
C. Sable
St. John
Portland
BOSTON
C. Cod
Providence
Newhaven
NEW YORK
Newark
PHILADELPHIA
Baltimore
Washington
Quebec
Three Rivers
MONTREAL
Ottawa
L. Champlain
Hudson
St. Lawrence
Toronto
Hamilton
Rochester
Buffalo
Petrolia
Oil Springs
Midland
Collingwood
Georgian B.
L. Nipissing
L. Temiscaming
L. Temagami
Sault St. Marie
Michipicoten
East Main
Albany
P. Arthur
Ft. William
Vermilion Ra.
Mesabi Ra.
Duluth
Copper
Keweenaw Pen.
Marquette
Ishpeming
Republic
Gogebic Ra.
Iron Mt.
Menominee
Milwaukee
CHICAGO
Mississippi
Detroit
Toledo
Lorain
Cleveland
Ashtabula
Conneaut
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PITTSBURG
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Longmans Green & Co. London. New York & Bombay

importance of this railway arises from the fact that it will form the shortest route for the products of the North-west to England, but its value depends in a great measure on the **navigability of Hudson's Bay** and Hudson's Strait. The difficulties of navigation are almost confined to the strait, which is 500 miles in length, and for the greater part of the year is obstructed by ice. There is every reason to believe, however, that for at least two or three months every year, and probably for steamers of suitable build considerably longer, this route would be available.[1] The ocean length of this route from Liverpool is 2,970 nautical miles to Port Nelson. Although Fort Churchill has the only natural harbour known to be available for large vessels, Port Nelson further to the south, and having also the advantage of lying at the mouth of a river with a wide valley in which there is much good soil consisting of a soft clay loam, has been preferred for the terminus. The additional distance by railway from the junction with the Canadian Pacific at Winnipeg is about 650 statute miles, but it is obvious that much, probably most, of the grain going this way would not past through Winnipeg, but would reach Port Nelson by shorter routes.

1256. The **minerals** of most importance commercially at present, or likely to be so in the immediate future, in order of importance, are coal (in the three forms of lignite, bituminous coal, and anthracite), copper, nickel, gold, silver, and iron. The coalfields are enormous in extent, though as yet worked only where there are special facilities for commerce, as in the neighbourhood of seaports (in the north of Nova Scotia, and in Vancouver Island, British Columbia), and at various points on or near the route of the Pacific Railway, where it is very abundant. Extensive as the coalfields are, however, it is important to note that there is no coal between the unimportant deposits of New Brunswick and those of Manitoba, that is, in all the most populous area of the Dominion. It is this that makes Canada so largely dependent on the United States, not only for anthracite, which is the fuel ordinarily used for domestic purposes and which enters the Dominion duty-free, but also for bituminous coal, which is subject to duty. There are, however, deposits of anthracite in the basin of the Carcase River, in western Alberta, estimated at 400 million tons, awaiting development. This province is also underlaid to the extent of about 30,000 square miles with bituminous and semi-bituminous coal. In British Columbia a coalfield producing coal of excellent quality, immediately to the west of the Crow's Nest Pass, began to be worked as soon as the branch of the Canadian Pacific Railway through that pass was opened. The amount of coal in this neighbourhood is said to be of enormous extent, one of the most extensive deposits known to exist in the world. The Vancouver Island coal is important as the only good coal as yet worked on the

[1] A report to the Ontario legislature expressed the opinion that steamship navigation would be safe from July 20 to November 1.

Pacific Coast.[1] Iron ore is met with in many places.[2] Gold is obtained in largest quantity in the Yukon district of the North-west Territories, and also in British Columbia and Nova Scotia. British Columbia produces, too, the bulk of the silver and copper of Canada, but copper is also produced along with nickel at Sudbury in Ontario. This province, moreover, produces nearly all the petroleum of Canada (in Lambton county) and most of the Canadian salt (near Lake Huron).

1257. The tables in the Appendix show the principal features of the **external commerce** of Canada, and the changes that have taken place therein since 1871–5. The great change shown in the relative position of wheat and timber in the export table in the last period is due to two causes, the heavy duties imposed on imported timber by the United States, and the rapid expansion of the wheat[3] area in Canada in correspondence with the diminishing rate of expansion in the United States. The cheese export shows the importance of the dairying industry especially in the eastern provinces, from which there is also a considerable export of butter, an export which has been greatly promoted by government encouragement to creameries and bounties granted to lines of steamers provided with refrigerating apparatus. Among the imports iron and steel goods[4] continue to hold the first place, but there is a diminution in the relative importance

[1] The total tonnage of anthracite and bituminous coals in Canada is estimated at 285,000 million tons. Of this four-fifths is in Alberta.

[2] So far no important deposits have been developed in Canada. The Michipicoten deposits in western Ontario and the Moose Mountains deposit at Sellwood, 60 miles N. of Key Harbour at the north-east angle of Georgian Bay, have both proved disappointing, but great hopes are at present entertained with regard to extensive deposits of ore said to be of very high quality beginning about 60 miles north of Kingston, Ont. In this district magnetite occurs in deposits of variable size scattered over an area of 1,600 square miles, but so irregularly as not to have led as yet to large development. Near Three Rivers bog iron ores have long been smelted, though in small quantity, in charcoal furnaces. Iron ores are also worked to a small extent in the north of the mainland of Nova Scotia and on Texada Island in the Straits of Georgia, B.C. Pig iron and steel production have greatly increased since the war.

[3] An analysis of the special trade in wheat, as regards quantity, shows that Canada is on the average of quinquennial periods rapidly increasing its surplus available for export. The period 1886–90 showed the smallest export of domestic wheat and flour since the formation of the Dominion—an average of about 3·8 million bushels per annum, but meantime the imports of wheat and flour for home consumption had been diminishing. Down to 1886 these imports exceeded one million bushels in every year except one, but they have since become a negligible quantity. On the other hand, the average annual export of home-grown wheat in the five years ending June 30, 1906, was 26·2 million bushels, that of flour 1·36 million barrels. In the five years 1909–10 to 1913–14 the total export of wheat from Canada increased from 49·7 to 120·4 million bushels, and that of wheat flour from 3 to 4·8 million barrels. The area suitable for cultivation in the north-west is officially estimated at 171 millions of acres (27 in Manitoba, 50 in Assiniboia, 52 in Saskatchewan, and 42 in Alberta), and if one-fourth of this area were in wheat the average production would amount to 800,000,000, on the supposition of an average yield equal to that of Manitoba for the ten years 1894–1903.

[4] Under all important headings by far the larger proportion of such goods now come from the United States. The one item in which the United Kingdom still retains the first place is the rather insignificant one of cutlery.

of cotton and woollen manufactures. The tea and coffee consumed in the Dominion were both imported chiefly through the United States till after the opening of the Canadian Pacific Railway. From the United States Canada also gets large supplies of refined sugar, though sugar-refining is now being carried on more and more largely in the Dominion, chiefly at Montreal. British shipping still takes the lead in the sea-borne traffic of Canada, but no small portion is conveyed under the Canadian flag, some of the Canadian shipping belonging to the government.[1]

1258. Since 1879 the foreign commerce of the Dominion has been greatly affected by the increase of the customs tariff, with the view of developing local manufacturing industries. The more important **manufacturing industries** are those which consist in subjecting the raw materials of the country to the simplest processes, preparatory to sending the products to a home or foreign market—flour-milling, saw-milling, the manufacture of wood-pulp and various articles made of wood, the making of boots and shoes, and other industries connected with leather—but in recent years there has also been a considerable development of cotton and woollen manufactures and the manufacture of agricultural implements. An attempt was made to stimulate the iron industry of Canada by bounties as far back as 1883, but the most important act with this view was that of 1897, under which bounties were granted on every stage of the iron industry from the raising of the ore to the manufacture of steel. Under this encouragement important iron and steel-works were established at Sydney, N.S., Hamilton, Midland, Sault Ste. Marie, Port Arthur, and elsewhere.[2]

1259. A new feature was introduced into the external commerce of the Dominion of Canada by the adoption under an act of 1897 of a preferential tariff in favour of British goods, which from August 1, 1898, were to be admitted on the payment of customs duties 25 per cent. less than those levied on foreign goods. The preferential reduction was afterwards raised to $33\frac{1}{3}$ per cent. from July 1, 1900. The abatement applies not only to the produce of the United Kingdom but also to that of the West Indies, as well as that of any other British colony which has a customs tariff on the whole as favourable to Canada as the reduced Canadian tariff is to it. The abatement has since been made specific.[3] Under the Canadian tariff a special (dumping) duty

[1] Canadian government lines already run to various ports in the United Kingdom, to the British and other West Indies, and to South America.

[2] These bounties ceased at the end of 1910 except for wire-rod (fencing wire entering Canada duty free) and pig-iron made by electrical processes.

[3] The following figures may be of some interest in connection with this measure. The percentage value of the imports into Canada from the United Kingdom reached its maximum, 58·57 per cent., in 1871–2. After that year there was a pretty steady decline till 1898–9, when the percentage was 24·05. Meanwhile the percentage of the United States had risen from 33·09 in 1871–2 to 60·96 per cent. in 1900–01. In that year, however, more than 50 per cent. of the value of the imports from the United States was duty free, as against only 26·3 per cent. from the United Kingdom. The duty-free articles from the United States included

is usually charged equal to the difference between the export price and the 'fair' market value of the same for home consumption.

1260. Provinces and Towns.—(1) **Nova Scotia,** a province including both the peninsula of that name and the island of Cape Breton to the north: in all about two-thirds of the size of Scotland. The fertile land, less than half the entire area, is mainly situated in the interior. The valleys of Annapolis and Gaspereau on the west side parallel to the coast are the most favoured districts in respect of soil and climate, and above all noted for their apple orchards. The fisheries of this province furnish the bulk of the Canadian export of fish (**500, 501**). The capital, Halifax, on the east coast, is situated at the head of a fine natural harbour, which in most years is free from ice all the winter through. It is the principal naval station of British North America. British troops were quartered here till the first of September 1905. The city and harbour are defended by fortifications. Some iron is smelted at Londonderry in the northern part of the mainland of Nova Scotia, but the most important iron and steel works in the whole of the Dominion have been established at Sydney in Cape Breton Island, where coal of excellent quality for smelting purposes and limestone for flux are both found in abundance close beside the admirable natural harbour formed by the Bras d'Or Channel. The ore is obtained from Newfoundland. Louisburg, on the east coast of Cape Breton Island, has been connected with the iron-works for use as a winter port.

anthracite to the value of nearly eight million dollars, beside various kinds of lumber and timber, hides, maize, raw cotton, mining machinery, steel rails, crude rubber, and settlers' effects, each to the value of more than one million dollars, whereas the only duty-free goods imported from the United Kingdom to the value of as much as half a million dollars were hides, raw wool, jute cloth, and settlers' effects, none of these reaching the value of one million dollars. The principal textile manufactures of the United Kingdom even with the abatement granted by the tariff as it existed in 1907 were subject to duties varying from 15 to 25 per cent. *ad valorem*, and that on certain woollen and worsted goods of British origin amounts to as much as 30 per cent. *ad valorem*, as against 35 per cent. of other origin. In 1913–14 the percentage value of the imports from the United Kingdom was 21·35 as against 64·0 from the United States. Inevitably the war told adversely on British imports, which in 1917–18 sank to 8½ per cent. of the total, in the following year to less than 8 per cent. As throwing light on the steady gain of the United States on the United Kingdom in the Canadian market before the war it should be borne in mind that in the competition the United States has the following advantages among others to countervail the preference: (1) that transport from the United States can be effected without break of bulk; (2) that the ports at which British goods must be transferred from ocean ships to railways or some other means of carriage are at a great distance from the most populous parts of the Dominion (Montreal 335 miles from Toronto, 1,424 miles from Winnipeg); (3) that the large and highly-protected market of the United States—see par. **202** (4)—greatly favours the economies of large-scale production; and (4) the similarity of tastes and needs of the two countries is favourable to mutual commercial intercourse. (See also *Scot. Geog. Mag.*, 1910, p. 180.) A revision of the customs tariff was promised for 1921, but was postponed owing to the fact that of Canada's total trade 57 per cent. was with the United States, and the Chancellor considered it wiser to wait until the settled tariff policy of Washington should be known before attempting a revision.

Halifax (1921) . . . 70,000

1261. (2) Prince Edward Island, about the size of the county of Norfolk, in the bay of the Gulf of St. Lawrence between New Brunswick and Nova Scotia. From the nearest point of New Brunswick it is distant nine miles. Capital, Charlottetown, on a large, deep, and well-sheltered harbour. Fox farming is an important industry. The conditions of soil and climate appear to favour the production of the finest furs.

1262. (3) New Brunswick, rather less than Scotland in size, very rich in forests, and also possessing valuable fisheries. The capital is Fredericton, a small town at the head of navigation for steamers, on the St. John River; but the largest town and chief seaport is St. John, occupying a fine harbour on the Bay of Fundy, at the mouth of that river. The harbour is open all the year round, is safe, easy of access, and capable of accommodating vessels of thirty feet draught, and since the port has been connected with Montreal by the 'Short Line,' and more particularly since the subsidising of a line of steamers to Liverpool in 1895, a great trade in live-stock, dairy produce, &c., has been developed. The province is rich in minerals. Iron, gypsum, coal, building stone, copper, manganese, and potash salts are found, but only coal and gypsum are actively mined. Coal production is decreasing. Gypsum is produced from Hillsboro quarries.

1263. (4) Quebec, on both sides of the St. Lawrence, mostly east of the Ottawa, a province approximately eight times the size of Great Britain, but with the limited inhabited area above indicated (**1243**). The winter is long, snow generally covering the ground (sometimes to a depth of more than three feet) from December to April; but the summer is warm enough to grow not merely the ordinary crops of the British Isles, but also maize and tobacco. About four-fifths of the inhabitants of the province are of French origin (**1239**) and still speak French. Of late years they have even been spreading into the so-called Eastern Townships, on the south bank of the St. Lawrence, where the bulk of the settlers were originally English. Large numbers emigrate to the New England states, where they work in textile factories.

The capital of the province is Quebec, situated at the confluence of the Charles River with the St. Lawrence, and now the lowest point at which the river is bridged (**1254**). Once the head of navigation for large vessels, it has had its growth checked by the deepening of the river above the town, and by other causes; for though trans-Atlantic passengers generally prefer to land or start here, goods show their usual tendency in favour of water carriage without transhipment as far into the heart of a country as possible. This circumstance has accordingly favoured the rise of Montreal, now the chief seat of commerce in the Dominion. Montreal stands on an island in the

	1861	1881	1891	1901	1911	1921
Quebec .	60,000	62,500	63,100	69,000	78,000	—
Montreal .	90,000	141,000	215,000	270,000	470,000	610,000

St. Lawrence, at the confluence of the Ottawa, 180 miles (by river) above Quebec. All the improvements in the communications above the port tend to increase its shipping and population.[1] (See also **1247, 1252**). A railway, 25 miles long, which has been laid to the town rising round the water-power of the Shawinigan Falls is likely to make Three Rivers below Montreal a considerable seaport. The hydraulic resources of the province are receiving the careful attention of the government. Two important storage dams have been built. The La Loutre at the head of the St. Maurice, probably the largest artificial reservoir in the world, has a capacity of one hundred and sixty thousand million cubic feet, and the water area is 300 square miles. The storage will permit a permanent flow of 12,000 cubic feet per second at Shawinigan, in round figures 1,000,000 permanent h.p. are now available on this river. The St. François dam is expected to store twelve thousand million cubic feet, and will materially assist the numerous pulp and other mills along its course. A new graving dock has been erected at Levis, with a length of 1,150 feet, 120 feet wide, and a depth at high water of 40 feet.

1264. (5) **Ontario,** about $4\frac{1}{2}$ times the size of Great Britain, is the province to the west of Quebec, extending along the north of the great lakes. The populous region, which is the most southerly part of the whole of the Dominion, has a much shorter winter than that of Quebec. In the south, wine is produced from native grapes, and a strip running eastwards from Hamilton and bordering Lake Erie, where the physical configuration affords protection against cold winds, is known as 'the garden of Canada,' from its being so peculiarly adapted to the cultivation of table grapes, peaches, and other soft fruits. Ontario produces 75 per cent. of all fruit grown in Canada. The district in the vicinity of Lake Temiscaming north-west of Ottawa and that bordering the Rainy River to the west of Lake Superior are two of the more favoured strips in the Archæan region of Canada (**1245**), where agricultural settlement is now going on. The province produces about one-half of the milk, cheese, butter, and casein of Canada. Forests cover an area of 102,000 square miles. Ottawa, the seat of the Dominion government, stands on the river of the same name, about ninety miles above its confluence with the St. Lawrence. It is the centre of the lumber trade of the province, and has the largest saw-mills in Canada. The capital of the province is Toronto,[2] near the west end of Lake Ontario, on which it has a fine harbour, and is so situated as to form the centre at which the railways running from

[1] In 1906 the ship-channel up to this point had a depth of $27\frac{1}{2}$ feet, but this was increased to 30 feet in 1912. The trade of Montreal has been greatly stimulated by the freeing of the Canadian canals from tolls in 1903. In that year nearly 20 per cent. of the shipments of grain from Chicago and Duluth passed through Canadian territory.

[2] Population (present area) in 1881, under 100,000; 1891, 181,000; 1901, 208,000; 1911, 380,000.

the east parallel to Lake Ontario begin to diverge in different directions through what has been called above the Lake peninsula. The town is becoming a great seat of manufactures (agricultural implements, &c.) and is growing as rapidly as Montreal. Iron-works and other manufacturing industries are springing up at the thriving town of Hamilton at the west end of Lake Ontario, and there are other iron-works and shipbuilding yards at Collingwood and Midland on Georgian Bay, and at Sault Ste. Marie are large wood-pulp mills and steel-works utilising by means of electricity the power of the rapids. Hydroelectric stations on or near the Niagara River utilise the difference of level between Lakes Erie and Ontario (about 330 feet) for power development.[1] Owen Sound on Georgian Bay is the shipping point of a large farming area. Sudbury (**1254, 1256**) and Kingston (**1250** and p. 617, *n.* 2) have been mentioned already. Fort William and Port Arthur on Lake Superior are great centres for the shipment of western grain.[2] Cobalt, near Lake Temiscaming, in northern Ontario, lies amidst great deposits of cobalt and silver. The chief inland town is London.

1265. (6) **Manitoba,** the rich, flat wheat-growing province in the west, is nearly three times the size of Great Britain. The capital is Winnipeg,[3] situated at the confluence of the Red River and the Assiniboine, which comes from the west. This town is now also the place of convergence of numerous railways (**1223**), and is hence rapidly growing as the trade centre for the wheatfields of the west.[4]

1266. The two provinces of Saskatchewan and Alberta, situated between Manitoba and the Rocky Mountains, were created in 1905. (7) **Saskatchewan,** consisting of the greater part of the former districts of Assiniboia and Saskatchewan, together with the eastern half of Athabasca, is mainly a wheat-growing province,[5] especially in the south-east. The manufactures, although still relatively unimportant, have increased fourfold in value since 1905. Flax-growing is being encouraged and linen factories have been established.[6] A sodium sulphate lake covering 250 acres has been discovered. The most important centres are the capital, Regina, Prince Albert, Saskatoon, and Moosejaw. (8) **Alberta,** consisting of the former district of Alberta with the western half of Athabasca and strips of Assiniboia and Saskat-

[1] Great works of this kind now (1921) in progress are designed to have turbines subjected to a head of 305 feet—130 more than the maximum near the falls.

[2] In 1906–7, 64·31 million bushels of grain were shipped from these two lake-ports, against 5·88 millions sent eastward by the all-rail route. A single vessel loaded 380,000 bushels, or upwards of 10,000 tons.

[3] Population, 1881, 8,000; 1891, 26,000; 1911, 136,000; 1921, 180,000.

[4] In 1881 the area under wheat in Manitoba was 51,000 acres; in 1902, 2,040,000; in 1903, 2,443,000; in 1908, 2,851,000; in 1918, 2,984,000.

[5] In 1905, area under wheat, 1,130,000 acres; in 1915, 8,929,000; in 1919, 10,587,000 (spring wheat only, winter wheat trifling).

[6] In 1915 acreage under flax was 395,000; 1919 acreage was 929,000.

Port Arthur . . . 50,000.

chewan, originally owed its settlement to the advantages of cattle-ranching offered by the natural pastures to the east of the Rocky Mountains (**1246**), but it is rapidly attracting agricultural settlers who grow more oats than wheat, though even winter wheat is produced in rapidly increasing quantity,[1] no doubt through the favour of the chinooks. In the south sugar-beet is grown under irrigation. The capital is Edmonton, at the head of steamer navigation on the Saskatchewan River, and at a point to which railways are giving increased importance (**1252**). The province is very rich in coal, which is mined near Edmonton, at Anthracite and Canmore west of Calgary, and round Lethbridge. Natural gas is abundant and is used extensively, and oil has been discovered 60 miles to the south of Calgary. In this province, round Banff, is the Rocky Mountains Park, 260 square miles in extent, with numerous hot springs and natural beauties.

1267. (9) **British Columbia** is a province four times the size of Great Britain, comprising on the mainland the area from 350 to 400 miles in width between the coast and the Rocky Mountains, composed of high tablelands and lofty mountain-ranges separated by deep and narrow valleys, but also including Vancouver Island and the coastal archipelago to the north as far as the Queen Charlotte Islands inclusive. Its wealth consists chiefly in its minerals, forests,[2] and fisheries (**501**). The discovery of gold first brought a rush of settlers here in 1856, but the deposits then discovered were worked out. Since 1895, however, gold, silver, copper, lead, and zinc mining have all been carried on, on a large scale, in the extreme south along and near the route of the southern branch of the Canadian Pacific Railway. The chief mining district is the Trail Creek division of West Kootenay, where the mining for all three metals in quartz rock is carried on. The principal mining centre is Rossland. A bounty is granted by the Dominion government to encourage the smelting of silver and gold, and coal is now largely mined and converted into coke at Fernie in the Crow's Nest coalfield for use in the smelters that have been erected in the Trail Creek district. Copper is also mined on Texada Island, where there likewise exist extensive deposits of iron ore. The oldest and most important coal-mines of the province are those of Nanaimo on the east side of Vancouver Island, and Comox, further north. Coal is also mined in the Nicola Valley and in the country traversed by the Tulameen and Similkameen Rivers. British Columbia is steadily

[1] In 1905, area under wheat, 107,000 acres (of which 32,000 winter wheat); in 1915, 2,138,000 wheat (40,000 acres winter); in 1919 the total wheat, 4,283,000 (41,000 winter).

[2] During the last decade British Columbia's proportion of mineral wealth has risen to upward of 25 per cent. of the total production of the Dominion. Its forests are providing large supplies of paper pulp.

Edmonton (1921) . .	60,000	Calgary (1921) . .	65,000

advancing to the front as an agricultural province with the aid of irrigation. The rich valleys and lowlands in the interior offer favourable facilities for fruit-growing and dairying. Of these the Okanagan valley contains the largest area of fruit lands in the province. Apples of excellent quality are exported in large quantities to the English and other markets, and peaches, nectarines, apricots, and vines are successfully grown. The forests of the coast range, composed of gigantic pine and fir trees, are among the grandest in the world. The capital of the province is Victoria, on a beautiful harbour at the south-east end of Vancouver Island. It has a considerable *entrepôt* trade. Any vessel passing through the Straits of Juan de Fuca will come out of its way to Victoria for a shipment of fifty tons. Esquimalt, on an excellent harbour adjacent to that of Victoria, has an arsenal and the largest graving dock on the Pacific coast. The largest vessels put in here, and there is regular steamship service to Vancouver, San Francisco, Seattle, Alaska, New Westminster, B.C., and Oriental ports. Vancouver, whose harbour, at the mouth of Burrard Inlet, has a depth of 27 to 30 feet alongside the wharves, and New Westminster, near the mouth of the Fraser River, are the western termini of the three great transcontinental railways. Mail steamers run regularly from Vancouver to Japan, China, Australia, Hawaii, New Zealand, Alaska, Seattle, and San Francisco.[1] New Westminster has an excellent harbour, and a 30-foot channel is being maintained in the river. It has one of the largest dry docks in the world. Since the opening of the Panama Canal Vancouver has become a centre for shipment of prairie wheat for Europe and the East. The name of Prince Rupert has been selected for the new port on Kai-En Island a little to the south of Port Simpson, as the terminus of the Grand Trunk Pacific Railway. A large dry dock was opened here (1921). It is about 3,860 nautical miles from Yokohama, 500 miles nearer than any other Pacific port. (Compare p. 614.)

1268. Northern Canada. The remainder of the Dominion is divided into the districts of Ungava (east of Hudson's Bay), Keewatin and Mackenzie, and the territory of Yukon. They all yield furs, and the Yukon territory is rich in gold and silver. It is here, not far from the Alaskan frontier, that the Klondike goldfield, with Dawson City, at the confluence of the Klondike with the Yukon, only about two degrees south of the Arctic Circle, as its centre, was discovered in 1896. The region is difficult of access, but not so difficult now that a railway leads from Skagway over the White Pass to a navigable river of the Yukon basin. The gold occurs both in alluvial deposits

[1] The quickest route from London and New York to the Far East is *via* Vancouver. Valuable cargoes of silk from China and Japan for New York are shipped through this port.

Vancouver, 1891, 14,000; 1901, 27,000; 1911, 100,000.

and in quartz, but the most easily worked deposits are exhausted.[1] Extensive oilfields were discovered in the Mackenzie River district in 1921.

B. NEWFOUNDLAND

1269. Newfoundland is a British colony, to which belongs not only the island of that name but also the dreary coast of Labrador. The present population is chiefly composed of fishermen, settled on the coast. (See also **500, 509.**) The island is known, however, to be rich in minerals, especially coal and iron, as well as in timber, the coalfields, situated in the south-west, being a continuation of those in Cape Breton Island. A railway has been made from St. John's, the capital of the island, on the east coast, running through the coalfields as well as through country well adapted for agricultural settlement, to the west coast. Iron ore of excellent quality is now mined with remarkable ease on the small island known as Great Bell Island in Conception Bay within eighteen miles of St. John's.[2] There are large paper and pulp mills at Grand Falls.

C. THE BERMUDAS

1270. These are a group of small islands about 750 miles to the south of Nova Scotia, producing tropical and temperate fruits and vegetables, and frequented by invalids for the sake of their equable climate.

[1] The production of gold in the Yukon district increased from a value of about £60,000 in 1896 to £500,000 in 1897, and £4,450,000 in 1900, then decreased to less than £1,000,000 in each of the three years 1907–9.

[2] These Wabana deposits, as they are called, contain on the average about 54 per cent. metallic iron, and are comparatively free from deleterious ingredients. They pass from the island under the sea, and the amount of ore on the island was estimated by Mr. Howley, director of the geological survey of Newfoundland, in *The Iron Resources of the World* (vol. ii., p. 272), at about 113,000,000 tons, with a possible submarine reserve of about 3,523,000,000 tons.

UNITED STATES

1271. The compact territory of the United States, between Canada and Mexico, extends over an **area** of about three million square miles, or more than thirty-three times the area of Great Britain. Physically this territory is a continuation of that of Canada. In the west the mountains of British Columbia are prolonged into Washington, Idaho, and Montana. In the middle the plains and prairies are similar in the two countries, and the south-eastern highlands of Canada form the northern extremities of the Appalachians. Almost the entire **population** [1] of the United States is of non-American origin, being composed either of immigrants or descendants of immigrants from Europe, or of descendants of African negroes originally introduced as slaves on the southern plantations. It is in a large measure due to this cause, and to the fact that the development of the population has from the first depended in a great measure on commerce with Europe, that the density of population is greatest in the east, and above all in the vicinity of the great seaports from Massachusetts Bay to Chesapeake Bay.

1272. At the present time there is no other region in the world with so vast a field for **immigration** under the now existing economic conditions, and hence no other state has its population steadily reinforced by so abundant a stream of foreign settlers. In the ten years 1877–86 the total number of immigrants was upwards of 4,200,000, and in one year (1882) the number approached 800,000. In two years the number of immigrants from Europe exceeded 600,000. Till near the end of last century the United Kingdom furnished the largest contingent of immigrants from the earliest date from which statistics are obtainable, but from about the middle of the nineteenth century the German quota approached, and occasionally exceeded the British.[2] A large

[1] For the rate of increase of population as compared with the United Kingdom and Germany, see par. 713.

[2] In recent years a change has taken place in the character of the immigration. In the ten years ending June 30, 1890, the United Kingdom and Germany together furnished rather more than 55 per cent. of the immigrants; in the ten ending June 30, 1910, less than 14 per cent.; the contingents supplied by Austria-Hungary, Italy, and Russia (including Poland) in the same periods were equal to 24½, 23, and 18 per cent. of the total respectively. In the four decades ending with June 30, 1880, 1890, 1900, and 1910, the total number of immigrants in millions was 2·8, 5·2, 3·8, and 8·8. In the last five years before the war, that is, the five ending with June 30, 1914, the number of immigrants was 5·2 millions, in the next five, 1·2. Immigration of any nationality is restricted for 15 months beginning April 21, 1921, to 3 per cent. of the population of that nationality in the country at the census of 1910.

number of the non-European immigrants are from Canada, and hence in the first instance likewise of European origin. Chinese immigration was at one time considerable, but is now practically prohibited. The negro population, though not recruited by immigration, is multiplying rapidly by natural increase[1] (excess of births over deaths), but the small native Indian population is dwindling away or becoming absorbed. Since the extension of railways and the improvement of other means of communication facilitating commerce over great distances, large numbers of this immigrant population have settled in the fertile lands or the mining centres of the western states, which are likewise attracting a still greater number of inhabitants from the earlier settled states in the east. The centre of population of the United States has advanced about one degree of longitude, or more, westwards at every decennial census since 1810.

1273. In relation to the commerce of this vast region, it is highly noteworthy that there are special circumstances both in the history of the country and in the physical features of its territory, that have favoured the unity of its government. In consequence of this unity there is free trade here, as in the Dominion of Canada, from ocean to ocean; and though the individual states have each legislative powers within certain limits, there could be no more striking illustration of the importance to commerce of the central government than the passing, in February 1887, of the Interstate Commerce Act, which may be briefly described as an Act prohibiting local and individual preferences on the greater highways of commerce throughout the length and breadth of a territory four-fifths the size of Europe. As to labour legislation, see par. **108.** The seat of the general government is Washington.

1274. If we look at this unity of government from an historical point of view, there are several important considerations to bear in mind. The separate 'plantations' or colonies that ultimately formed the first United States grew up independently from several convenient starting places, like the Australian colonies and the republics of South America. They grew up under English influence indeed, and with a common language, but this would not in itself have sufficed to make them one, and it was perhaps fortunate that when they had become strong enough, they were united in a common war against the mother country; fortunate, too, that, when that war was over, the common burdens which it entailed necessitated a common government, and that the great state thus formed held such a preponderance in the middle of the continent that it easily acquired in course of time all the present territory by purchase or conquest. And it was likewise fortunate that, when the practice of slavery in the southern states

[1] In 1900 the negro population of the United States (almost confined to the south-east) was 8,841,000, as against 7,489,000 in 1890; in 1910, 9,828,000, both showing a lower rate of increase than the general average of the population.

threatened a permanent division, the North should have been strong enough, in virtue of its more rapid development by immigration, to conquer the South by mere force of wealth and numbers (1861–65). In the course of this war the slaves of the seceding states were declared free by proclamation of the President of the republic, and immediately after the conclusion of the war an amendment to the constitution of the United States abolishing slavery throughout their territory was duly adopted.

1275. Physically the circumstance most favourable to union is the fact that the central region is one great plain communicating freely with other plains and lowlands in the east, and in the west sloping imperceptibly up to the tableland which forms the base of the Rocky Mountains, and that this great central plain is traversed by some of the grandest **navigable rivers** in the world. The eastern and larger portion of this central region, from about 100° or 101° W., has a fertile soil and adequate rainfall, so that everything has combined to favour continuous and progressive settlement. As settlement went on nearly every part of it [1] has had the great advantage of easy communication with other neighbouring settled districts.

1276. The Mississippi, the great waterway running north and south through this region, is continuously navigable for steamers of considerable size to Minneapolis at the lower end of the rapids below the Falls of St. Anthony, on the parallel of 45°, that is, to within four degrees of the northern frontier. The portion of the river from this point to St. Louis is spoken of as the Upper Mississippi. The river traverses a region in which the products of temperate and tropical climates are brought closer together than in any other part of the world, and before the introduction of railways formed the principal channel of communication between districts with the diverse wants due to diversity of production. Even yet, it need scarcely be added, it is of high importance as an auxiliary and rival means of communication. 'During the navigation season of eight months more freight is floated on the Upper Mississippi than any of the three great trunk lines of railroad carry in a year, and at about one-third the rate.' [2] (See also par. **1236.**)

1277. The navigation of the lower river is naturally much more important, and especially below Cairo at the confluence of its great left bank tributary the Ohio, which is navigable, with only one interruption, for large steamers for six or eight months in the year, as high as Pittsburgh (in about the same latitude as New York), where the river is formed by the union of two other navigable streams. The one interruption referred to is in the form of rapids, avoided by a short canal at Louisville, and for small steamers these rapids are not insur-

[1] For accounts of a notable exception see Ellen C. Semple on 'The Anglo-Saxons of the Kentucky Mountains,' in *Geog. Jour.*, vol. xvii., pp. 588–623, and C. R. Dryer, *Elementary Economic Geography*, pp. 37–43.

[2] *Report on the Internal Commerce of the United States for* 1887, p. 27.

mountable. To St. Louis, about 1,270 miles above New Orleans,[1] vessels drawing 16 feet can ascend during the high stage of the river, which usually begins in May or June and lasts for about three months, but the bulk of the business is done in boats of 8 feet draught or less. As compared with the Rhine, however, the traffic is small in proportion to the physical advantages mentioned. But besides the disadvantage of a very winding course the river suffers from very unstable banks. Even in the quietest state of the river landslips are constantly occurring, and the population on its immediate banks is relatively small (comp. p. 383, *n.* 3). On the other hand, traffic is promoted by heavy cargoes collected on the banks of the river and its feeders—Pittsburgh coal, as already indicated, and elsewhere timber, for which St. Louis and Cairo are great storage places. In illustration of the importance of this navigation it may be mentioned that a 'tow-boat' (or stern-wheel steamer used for propelling cargo-boats) has been known to proceed down the stream from Louisville, pushing before it thirty-seven barges with a total cargo (including that of the propelling steamer) equal to nearly 26,000 tons, and by this system coal is known to have been carried from Pittsburgh to New Orleans, a distance of 20,000 miles, at the cost of about 60 cents, say 2*s.* 6*d.*, per ton, equal to ·015*d.* per ton per mile.[2]

1278. The Cumberland and the Tennessee, on the left of the Ohio, and the Wabash on the right, have likewise considerable stretches of navigable water. The Red River, the Arkansas, and the Missouri, the great right-bank tributaries of the Mississippi, are also all navigable for hundreds of miles, the Missouri for more than two thousand miles, steamers being able to ascend it uninterruptedly to the Great Falls, about 100 miles below the gorge known as the Gate of the Rocky Mountains. In the same great plain, but outside of the basin of the Mississippi, the Red River of the North, which flows northwards into Canada, is navigable for steamers to Fargo, a point about 200 miles in a direct line from the limit of continuous navigation on the Mississippi.

1279. The Appalachian Mountains in the east, and the Rocky Mountains and other chains in the west, form an interruption to communication in this, among other ways, that they cause the rivers which cross them to have their navigation interrupted by rapids. It is partly on this account, partly on account of their smaller size, that the rivers of the Atlantic coast are of less importance than those of the great

[1] Only about 600 miles direct. Compare the Rhine, on which the river distance between Mannheim and Rotterdam is only about 13 per cent. longer than the railway distance.

[2] *United States Census*, 1890, 'Report on Transportation Business,' Part II., p. 410. The report showed nevertheless that the goods traffic on steamers was decreasing in consequence of railway competition, but the Federal government has resolved to promote the revival of river traffic as a relief to the congested railways. In 1918 it voted 8,000,000 dollars for the improvement of the Lower and 3,600,000 for that of the Upper river.

plain as navigable streams; but it must be remembered that some of them (the Hudson, Delaware, Susquehanna, Potomac, and James River) are of great value to commerce as forming, like the rivers of the British Isles, fine harbours in their estuaries; and the inland navigation of the Hudson, a broad, deep river, navigable for large steamers to the latitude of the Catskill Mountains, for smaller ones to the falls at Troy, is of great importance, and was the first cause of the growth of the greatest of all American seaports (New York).

1280. The Columbia River, the principal navigable stream belonging to the Pacific drainage of the United States, has its navigation frequently interrupted by falls and rapids, and so too has its chief United States tributary, the Snake River. On the main stream, the lowest interruption of this nature is the Cascades, 165 miles from the mouth, but costly works now allow of navigation being continued past this obstruction.

1281. The obstacles presented to the laying of railways by the great mountain chains in the east and west are less perhaps than might have been expected from the extent and height of the mountains. The gradual slope of the ground up to the base of the Rocky Mountains has facilitated the laying of railways to the foot of the passes, and several routes have been discovered along which railways could be advantageously laid across these and other western mountains. A comparison of the three most important of these routes with the great Canadian route is given under Canada (**1252**); and here it may be added that the Californian valley, physically the most isolated of all the more productive regions of the United States, is now connected by rail with the rest of the country by lines laid across the mountains on the north, east, and south (**1227-1229**).

1282. In the case of the Appalachian Mountains (that name being now used as a general term for all the mountain ranges in the east), it is an important physical feature of the United States that in the north-east, precisely where population is densest, mineral wealth most abundant, the connections between east and west most important, that system breaks up into a great number of smaller mountain ranges with many gaps between them, facilitating railway and canal construction. To this region belong several of the most serviceable **canals** of the United States, among others the Erie and Champlain canals. The Erie Canal, laid through the Mohawk valley, serves to connect the navigation of the great lakes with New York, starting from Buffalo, at the eastern end of Lake Erie, and proceeding eastwards to Troy and Albany on the Hudson. It was opened in 1825, and the fact that it was the means by which wheaten bread first came into general use in a large part of the eastern states, which was ill-fitted for wheat cultivation,[1] will serve to give an idea of its importance at that date.

[1] In 1886 the New England States, containing about $\frac{1}{12}$ or $\frac{1}{13}$ of the population of the country, produced only $\frac{1}{370}$ of the wheat crop.

New York then first came to exceed Philadelphia in population. Its largest dimensions on the old route admitted of barges of at most 250 tons. The new Erie Canal, 12 feet deep, passing through Oneida Lake, adapted to barges of 1,000 tons, was opened in 1918. Its western termination on Niagara River is at Tonawanda, from which point connection is established with Buffalo partly by the river, partly by the Black Rock Canal, which has a depth of 22–23 feet, opened in 1914. The Champlain Canal connects the eastern end of the Erie Canal with the head of Lake Champlain, and thus completes the waterway between New York and the St. Lawrence. The Cape Cod Canal, opened in 1914, cutting across the hook-shaped peninsula in the east of Massachusetts, reduces the distance between Boston and New York from 334 to 272 miles, and enables vessels to escape the risks of the voyage round the Cape.[1] Its depth at mean low water is 25 feet.

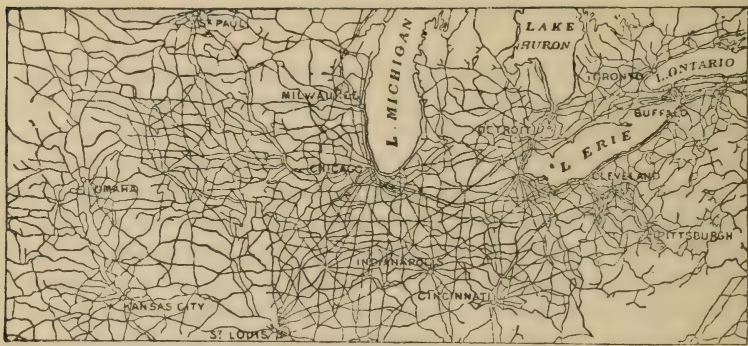
1283. Since the construction of the Erie Canal the fertile lowlands of the Mississippi basin have had the advantage of two great waterways in communication with the ocean, and more or less competing with one another and affecting the competition of railways running in different directions. This may be illustrated by an account of an important part of the trade of St. Louis, the great commercial centre on the Mississippi, a little below the confluence of the Missouri. Here reside the merchants who handle a large part of the grain grown in the region to the west, including eastern Kansas and Nebraska. The nearest ports for that grain are Galveston and Houston, which latter port is now connected with Galveston Bay by a channel 25 feet deep. If the railways to these ports become congested, and are consequently disposed to charge too high rates, the merchants can apply for rates by rail or river to New Orleans, by rail to Baltimore or some other eastern port, or partly by water by the route here spoken of to New York. The grain traffic by the old Erie Canal declined very rapidly,[2] but this did not prevent it from having a great influence on the cost of carriage.

1284. The physical features that favoured the construction of the two waterways from New York, mentioned in par. **1282,** are now of the greatest importance for the railway connections of that port. The Hudson and Mohawk valleys allow of railway connections with easy gradients between New York and Chicago, and at one time this was the only route for the great expresses between these two cities, even

[1] The wrecks here used to average thirty-five a year.

[2] In 1886 the cost of carriage of a bushel of wheat from Chicago to New York was 16·5 cents by an all-rail route, 12 cents by lake and rail, and only 8·71 cents by lake and canal. In that year upwards of 45 millions of bushels of grain and flour were carried through the Erie Canal. In 1900, the corresponding rates were 9·98, 5·05, and 4·42 cents, but the total movement of wheat on all the New York State canals (of which the Erie Canal is one) declined from 37·6 millions of bushels in 1862 to 4·6 millions in 1900. What the result of the new canal will be it is too soon to say.

although in following this route one has to run for 140 miles north before turning westwards. This route still competes easily with the more direct but more difficult route through the Alleghany Mountains. It is these physical features which no doubt have enabled New York to beat Boston in competing for the bulk of the traffic with the important hinderland of which Chicago is the centre. Boston is cut off from that hinderland by the Hoosac Mountains in the west of Massachusetts, through which there was no railway tunnel till 1875. Even now that route appears to be a difficult one, for a large part of the traffic of Boston with the west passes through New York. While the Hudson and Mohawk valleys afford an easy route between New York and the west, the Hudson, Lake Champlain, and Richelieu valleys afford an



RAILWAY MAP OF A PORTION OF THE UNITED STATES
Natural Scale 1 : 18,000,000

equally easy route running almost in a straight line due north between the Adirondacks and the White Mountains to Montreal.

1285. In the southern part of the Appalachian system, that to which the name of Alleghany Mountains is sometimes confined, the ranges are higher and more continuous, and there is still a stretch of about 400 miles with only one railway across it, and immediately to the west of that stretch there lies one of the most sparsely peopled districts of the eastern states—that referred to on p. 628, *n.* 1.

1286. This scantily peopled area is shown in the eastern part of the railway map in par. **1284.** The chief aim of this map, however, is to illustrate the peculiar economic conditions of the United States, as compared, for example, with Russia. The map is on the same scale as that of Russia (pp. 428–9). It embraces most of the area of the United States in which the products are similar to those of Russia. The area is everywhere relatively less populous than the most productive parts of Russia, and yet it has a railway network incomparably more intricate than that of the European country with a corresponding industry. The difference between the two in this

respect speaks eloquently of the difference between an old agricultural country composed of a multitude of more or less self-contained districts and a new country whose rapid development depends on distant markets, domestic or foreign. The existence of this network, constructed at a time when population was sparse and land cheap, must of necessity be of the utmost consequence to the country as population grows denser.[1]

1287. With regard to **climate,** we have in the United States as in Canada to note differences as well as resemblances in comparing different parts of the country with corresponding parts of Asia and Europe in accordance with what is stated in par. **1235.** The continuous territory of the United States, that is, the territory belonging to it on the mainland of North America exclusive of Alaska, may be divided into four climatic regions with characteristic products, two east and two west of the meridian of 100° W., though the **boundaries** must be recognised as more or less arbitrary.

1288. The main **agricultural products** of the United States are mentioned under the four sections into which this vast country is divided below, but two general observations may here be introduced on the authority of two American investigators. Professor Russell Smith has pointed out that both in the north and south of the United States, crops like maize, cotton, and tobacco are widely grown, which, unlike the prevailing European cereals, do not cover the surface, and thus leave much soil between the plants liable to be washed away (**95**).[2] The other observation is taken from an instructive article by J. L. Coulton, which appeared in the 'Quarterly Journal of Economics' in November 1912. Pointing out that the years 1899 and 1909 were the only years for which reasonably accurate statistics of the quantity and value of more than nine-tenths of the crops grown in the United States were available, he finds that these revealed an increase of only 10 per cent. in quantity, as against one of 67 per cent. in value. The increase in food production within the country failed to keep pace with the growth of population, so that a diminishing surplus of foodstuffs was left for export. He anticipates that the development of agriculture in the United States during the twentieth century will be in marked contrast to that in the nineteenth. In the nineteenth century we saw a literal expansion, a movement westwards (especially, he might have pointed out, since the civil war of 1861–65). In the twentieth century he looks forward to progress along four lines: (1) reclamation by drainage,

[1] This anticipation is being more and more verified every year. The growth of the railway system of America under the peculiar conditions here indicated has led to the development of differences in railway management as compared with an old country like England. The nature of these differences is discussed in par. **140.**

[2] In cotton culture the danger here referred to has long been known. See F. L. Olmsted, *Journey in the Back Country* (London, 1860), pp. 19–20. But comp. par. **359.**

irrigation, and other means; (2) the making of new farms in woodland, &c.; (3) the more active and constant use of land already worked; and (4) more intensive cultivation and organisation. What has gone on since tends to show that this forecast was as sound as it is important.

1289. Great Divisions of the United States. A. The North-east.—North of the Ohio and Delaware Bay, comprising, among others, the New England States. This region corresponds with the same latitudes of eastern Asia chiefly as regards extremes of temperature, for it has not the very dry winters of the corresponding parts of Asia. In this region the inhabitants are almost all of European origin, and the products are similar to those of Europe. The eastern portion of it is the most densely peopled part of the United States, and that in which manufacturing industries are most highly developed (**1312, 1313**). The western half of it is the great maize and wheat-growing portion of the country, the north-west including the Red River valley. As to the towns and manufactures of this area see pars. **1313-16.**

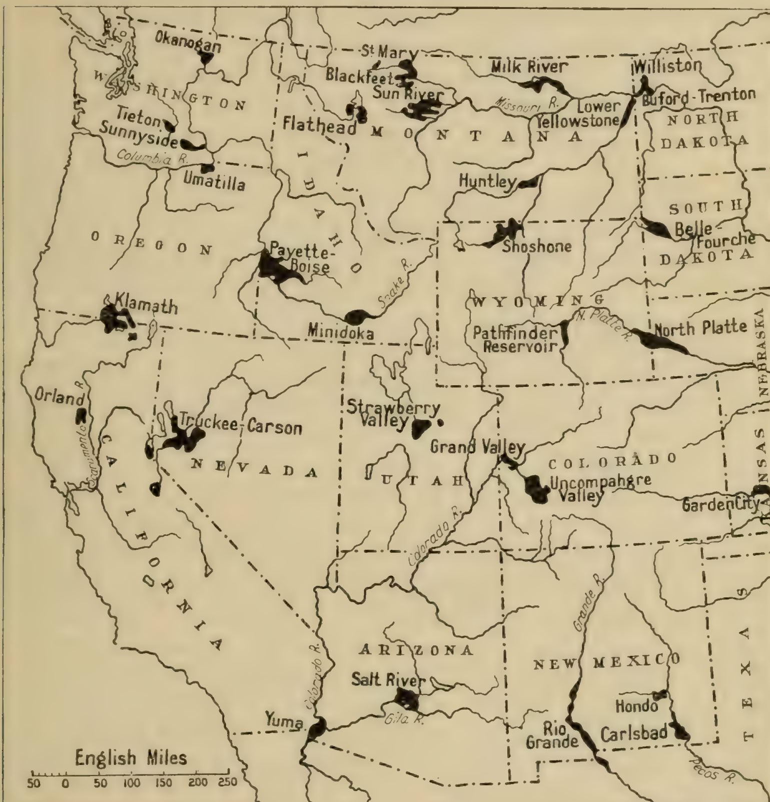
1290. B. The South-east, a region in which cotton and tobacco are grown as staples. The climate, though not generally good for wheat, is well adapted for maize and southern fruits, including the ground-nut, or, as it is more commonly called in America, the pea-nut or cow-pea, the American representative of the walnut known as the pecan nut,[1] and, in the far south, in spite of occasional disaster, even the orange (**1236**). Negroes in this region form a large proportion of the population in the states on both sides of the lower Mississippi, even outnumbering the people of European descent. Here the correspondence with the same latitudes in the east of Asia as regards rainfall is closer. There is for the most part a decided preponderance of summer rains (**65**), though the winters are far from rainless. The difference as regards temperature in the parts exposed to northerly winds is already noted in par **1236.** The rapid growth of arable farming in the sandy 'pine barrens' as they are called, which occupy a large portion of the wasted plain from N. Carolina to the lower Mississippi, a process of reclamation facilitated, it should be mentioned, by the neighbouring supplies of phosphatic fertilizers (**571·11** *c*), is a notable illustration of the observation made in the latter part of par. **1288.**

1291. C. The region between 100° and 120° W. (mostly tableland), comprising an area of about 1,200,000 square miles, may be described as the arid region of the United States, inasmuch as throughout its extent except in the neighbourhood of mountains (**64**), and near the northern frontier, the rainfall is too scanty for agriculture without irrigation. Here, therefore, we find the great majority of the irrigation schemes of the United States as shown on the accompanying map. This region corresponds in the north to the southern part of Western

[1] The fruit of a species of hickory, genus *Carya*, which is closely akin to the walnut, genus *Juglans*.

Siberia, and in the south to the arid and almost rainless tracts of Asia forming Russian Central Asia. The part of this region lying east of the Rocky Mountains and sloping gently downwards is known to American geographers as 'the plains.' It is a sheep and cattle-

PRINCIPAL IRRIGATION PROJECTS IN THE WESTERN UNITED STATES



From a paper by F. H. Newell, Director of Reclamation Service, U.S.A., in the *Smithsonian Report* for 1910.

rearing region. The western part, consisting of mountains and table lands (**1233**), is rich in metals.

1292. D. The Pacific Coast has a climate very closely corresponding to that of the same latitudes in the west and south of Europe and northern Africa. In the north the rains are very abundant west of the mountains. As we pass southwards we come to a climate closely resembling that of the Mediterranean region, the summers nearly rainless, the winters mild (**66**). The chief difference is in the rather low summer temperatures due to the prevalence of fogs, especially in the

low grounds. Gold, which first attracted a large population to this part of the world, is still an important product, but the fine Californian valley, watered by the Sacramento in the north and the San Joaquin in the south, now teems with wheat, barley, grapes, and southern fruits, and excellent wheat is also grown on both sides of the Columbian River,[1] as well as in the valley of its tributary, the Willamette, between the Coast and Cascade Ranges. In southern California various fruits and even wheat and barley are grown by irrigation, the water for which is obtained on the uplands by means of canals, on the low grounds from artesian wells. The earliest recorded canal was opened in 1835; the first in the Anaheim district in 1856. Nearly all the oranges and other citrus fruits are grown on the uplands, which are less liable to fogs than the low grounds. The fruits of California—oranges,[2] lemons, apples, prunes, raisins (since 1877), and dried peaches—furnish along with wine and wool the great bulk of the eastward traffic of the middle and southern trans-continental railways. On the mountains the forest scenery is highly remarkable. Dense forests of giant conifers cover the slopes, and a great timber trade has grown up round Puget Sound (Washington), at Seattle, Tacoma, Bellingham, and other ports.

1293. The products and deficiencies among the products of the United States will be most conveniently studied in detail with reference to the tables in the Appendix, **pp. 752–3**, showing the **chief** features of the **foreign commerce.** But in examining these tables from this point of view, two considerations must be borne in mind. In the first place, the foreign commerce of the country is greatly affected by the maintenance of a customs tariff calculated to foster native industries, in consequence of which there is an immense amount of manufacturing industry for home consumption of which these tables give no idea. Secondly, it must not be inferred that because certain agricultural products are largely imported into the United States, they are unsuited to the climate. The high price of labour in the country excludes or limits the production of certain commodities, such as sugar (**428**), tea (**393**), and raw silk (**336**), for which the climate of the United States in some part of their territory is in no way unsuited.

1294. The table of special exports suggests the inference that the United States is still on the whole pre-eminently an agricultural country, and this is true notwithstanding the immense increase in recent years in the number of those engaged in manufactures and mechanical and mining industries. It shows on a comparison of the period 1881–5, the first after the civil war in which figures could be obtained fairly comparable with those of countries having a currency on a gold basis, with the period of four years ending June 30, 1914, that the exports of machinery, iron and steel wares, leather and

[1] East of the Cascades, and mainly to the east of 120° W.

[2] About 60 per cent. of the citrus fruits of California are said to go to points eastward of Chicago.

cottons increased from an aggregate of 5·6 per cent. of the total value of the exports to 21·6 per cent. of that value.

The unfavourable circumstances affecting the cultivation of wheat generally (**246–50**) caused the area under wheat in the United States as a whole to remain practically stationary for many years,[1] the area under maize growing all the more rapidly. The extent of land now occupied by this crop is about twice as great as that under wheat, and its produce is about three times as much as that of the latter. The much smaller export of maize than of wheat is due to the fact that the bulk of the former crop is employed in the United States in feeding swine and other animals, so that the export of bacon, hams, lard, cattle, and beef, as well as maize, may all be regarded as representing this branch of American agriculture.

1295. The wood export of the United States takes place from Puget Sound (**1292**), Pensacola, New York, and various other ports. Pensacola, 55 miles east by south of Mobile, is the chief place of export of pitch-pine from the sandy 'pine-barrens' of Florida and the neighbouring states.

1296. The **living animals** exported from the United States are chiefly cattle, and these, as well as cheese, are mainly the produce of the states east of the Mississippi, and near the northern frontier west of that river; and it is in these regions that this branch of agriculture is most rapidly developing. It is in the western states and territories, however, that sheep are most numerous relatively to population, the drier climate there prevailing being favourable to the rearing of that animal, but the total number of sheep is declining through the breaking up of large ranches into farms. Sheep, moreover, are now being reared more for meat than wool, and the merino (**314**) is tending to disappear.[2]

1297. Among the agricultural deficiencies of the United States, which the import table in the Appendix betrays, attention may be drawn to two, sugar and fruits. Sugar, it will be observed, has held the first place among the imports of the United States from the earliest period entered in the table, 1861–65; the cause of which is already stated in par. **1293.** The ordinary fruits of the colder temperate climates flourish in the United States as well as in any part of the world, and are produced in sufficient abundance to leave a surplus for export. The imported fruits are principally those of the Mediterranean region, oranges, figs, grapes, currants, raisins, &c.; of these a large

[1] There were fluctuations in the wheat area, but on the whole no advance between 1880 and 1896, but after that there was a rapid rise from 34·6 to 44·6 million acres in 1899, but in 1900 again a decline. In 1913 the area was 50·2 million acres; in 1919, 73·2.

[2] Among the larger domestic animals in the United States, milch cows, swine, mules, and horses have shown the most rapid rate of increase since the beginning of the present century. The maximum number of cattle other than milch cows since that date was in 1907, 52 millions; in 1920, 44·5 millions; and that of sheep in 1903, 64 millions; in 1920, 48·6 millions.

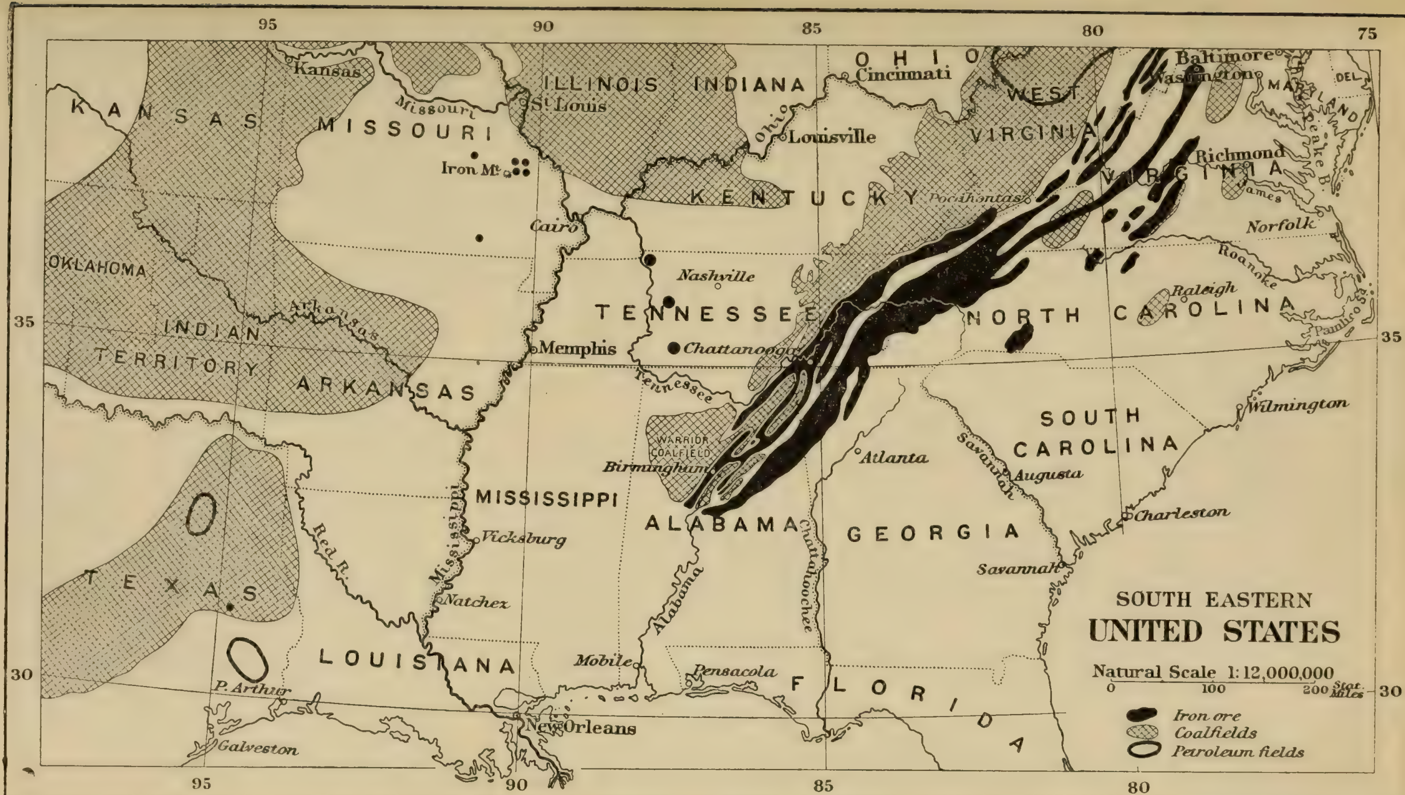
supply is now home grown in California (**1292**). A great deal of rice is grown in the swamps of Louisiana and other south-eastern states, and an upland variety in Louisiana and eastern Texas.

1298. Of the **mineral products** of the United States, the only one that takes a leading place among the exports, besides the precious metals, is petroleum, or mineral oil; but these items give no idea of the extent of the mineral resources of the United States. The fact is that besides the precious metals and petroleum, the United States now produce more iron, copper, and coal than any other country.

1299. Coal is produced both in the form of anthracite and bituminous coal, as well as lignite. The total production has been increasing with very rapid strides. The production of 1886 was more than three times that of 1870, and more than seven times that of 1860.[1] Of both the principal forms of coal, the chief producing state is Pennsylvania, which yields 60 per cent., or more, of the total quantity produced in the country. Anthracite is produced in several small fields in the east of the state, the centre of the region of production being about 200 miles from New York and 125 miles from Philadelphia. Access is afforded to the productive region by the valley of the Delaware, with those of its tributaries, the Schuylkill and the Lehigh, and in all of these valleys there is water communication (by canal or river), as well as, of course, abundance of railways. Bituminous coal is produced chiefly in the west of Pennsylvania, the large manufacturing town of Pittsburgh being situated about the centre of production. To this region belongs most of the coal used in making coke in the United States; the principal centre of coke-making being Connellsville, about 40 miles south-south-east of Pittsburgh. The Clearfield coalfield, situated to the north-east of the Pittsburgh area nearly due west of New York, supplies the best steam-coal in the neighbourhood of the northern Atlantic ports. The bituminous coal region of western Pennsylvania likewise extends into the adjoining states of West Virginia and Ohio, in the latter of which large quantities of coal are produced in the neighbourhood of the Ohio River. The Pocahontas coalfield, on the borders of Virginia and West Virginia, furnishes the best of all American steam-coal, now largely exported, even to Europe, by way of Norfolk and Newport News. Further west another productive coal region extends from the west of Indiana through Illinois to the east of Iowa; and Illinois is the state that ranks after Pennsylvania in the total amount of its production. Among the Appalachian ranges in eastern Kentucky and Tennessee, and northern Alabama, are other coalfields with a rising production, and many others are scattered over different parts of the United States territory.

1300. The **iron-ores**[1] of the United States are likewise very abun-

[1] The principal coalfields and iron-ore fields are shown in the maps on p. 639 and between pp. 640 and 641, and the recent increase in the coal and iron industries of the United States is discussed in pars. **515** and **539-42**.



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dant and very widely distributed. Many of them also are of excellent quality. But the chief supplies of ore are at a great distance from the smelting fuel. Nowhere in the country are the best steel-making ores found in proximity to smelting coal; and in some parts of the Lake Superior region, which in recent years have yielded fully three-fifths of the iron-ore produced in the United States, even timber suitable for making charcoal is almost wholly wanting.[1]

1301. Of the iron-ore ranges near that lake shown in the map on p. 615 the first discovered was the Marquette Range in Michigan. It has been worked since the year 1855. The Menominee Range, a little to the south, was discovered in 1877, the Vermilion Range in Minnesota in 1884, the Gogebic in Wisconsin in 1885, and the Mesabi in Minnesota not till 1892. This last discovery is the most important on account of the extraordinary facility with which the ores can here be worked. The deposits were originally covered merely with a skin of glacier drift. This having been removed, railway lines are laid to the ores, and these having been loosened by blasting when necessary, are then dug and loaded on the trucks by steam-shovels.[2] It is in a large measure the development of these and other mineral areas, together with that of the agricultural and more particularly the wheat region of the north-west, that has led to the increase of traffic through the Sault Ste. Marie canals.

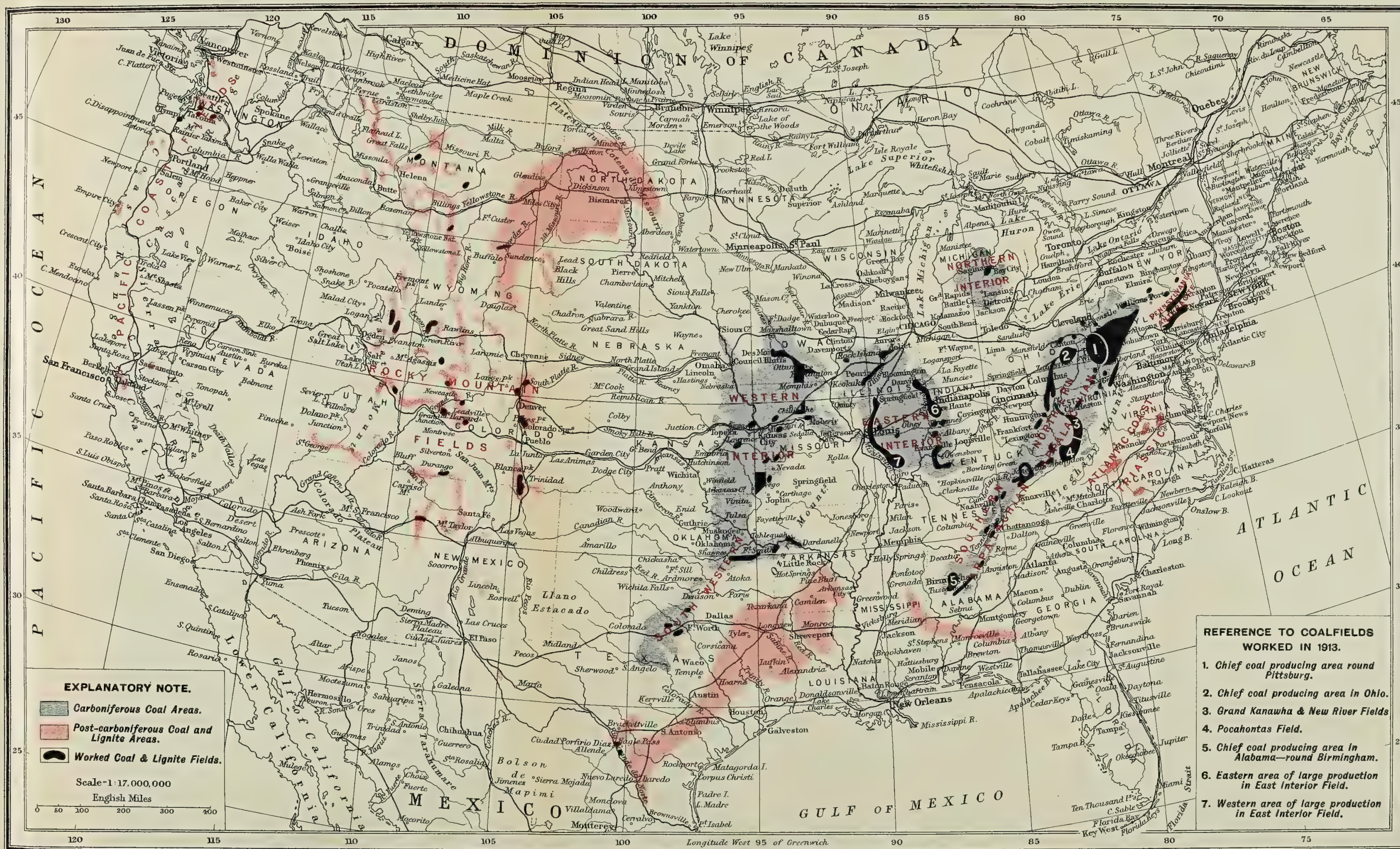
1302. For smelting, the general rule prevails in the United States, as elsewhere, that the ore is brought to the fuel, rather than the fuel to the ore; the cost of carriage being relatively less in the more valuable commodity. It is for this reason that the great centre of the iron industry of the United States is Pittsburgh, which in the early stages of the industry had the advantage of local supplies of ore as well as coal; and has likewise the advantage of being situated where two navigable streams unite to form the Ohio.[3] Some of the local

[1] According to the *Iron Ore Resources of the World*, the so-called red hematites and the hard specular iron-ores, the former entirely and the latter mainly produced in the Lake Superior region, and the fossil ores chiefly produced in Alabama and Tennessee, made up in 1907 nearly nine-tenths of the total production of iron-ores of the United States (pp. 757–8), and, as regards the future, ores of 60 per cent. iron content are, except as concentrates, a rapidly vanishing quantity, but of ores at 50 per cent. there is a supply for many years, and practically 'inexhaustible' reserves at 40 per cent. (p. 777).

[2] Each of these is attended by five men, and one machine has been known to dig and load 170,000 tons in 26 days, equal to a production of about 1,300 tons per man per day. The average labour cost is about 8*d*. per ton loaded on the cars, but at one mine upwards of 290,000 tons were dug and loaded in 174 days at a labour cost of 2*d*. per ton. The bulk of the miners at the date of the report were Finns, Austro-Hungarians, and Italians.—*For. Off. Reports, Miscel. Series*, No. 583 (issued about 1903).

[3] Round Pittsburgh, iron and steel industries of all kinds are almost as highly centralised as the cotton industry in Lancashire. In 1900 a large number of the most important iron and steel-working companies were united in a great trust with a capital of above £230,000,000. There are no fewer than thirty-eight plants belonging to this trust at different points on twenty-six miles of navigable water (the Ohio, Allegheny, Monongahela, and Youghiogheny) with Pittsburgh as a centre,

THE COALFIELDS OF THE UNITED STATES, WORKED AND UNWORKED



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supplies are long ago exhausted, and their total amount is scanty, but Pittsburgh still has the advantage of fuel in a higher degree than any other town in the United States; for not only is it within easy reach of the Connellsville coke, but it is likewise one of the great centres of the trade in petroleum. For several years also its iron, glass, and other industries dependent on fuel had the advantage of natural gas, which issues from the ground within a radius of from twelve to twenty miles, and is conveyed to the city by pipes, but the price of this gas is now so great that it is mainly used for domestic purposes. Pittsburgh produces about one-fourth of the pig-iron made in the United States, and carries on all branches of the iron and steel industry to a greater extent than any other city in the country. The chief supplies of ore to Pittsburgh are now necessarily brought from the Lake Superior region, but considerable quantities are likewise derived from eastern Pennsylvania. In the making of glass the employment of natural gas was as beneficial to the quality of the product as in the making of iron, and from the same cause, the absence of sulphur (**522**). At a trial of window-glass made from coal and from gas-fuel at Pittsburgh it was found that newspaper print could be read through eighteen sheets of gas-made glass placed behind one another, whereas nothing could be seen distinctly through six sheets of similar coal-made glass.

1303. Next to Pennsylvania in the production of pig and rolled iron, and the larger iron manufactures, comes Ohio, whose coalfields are easily supplied with Lake Superior ores; and then Illinois, which is readily accessible to supplies of the same ores in the north, and has large coalfields in the south-west within easy reach of the ores of Missouri. In the south-east the iron industry of the United States is most rapidly developing on the coalfield of northern Alabama, which is situated in the very midst of enormous supplies of iron-ore suitable for the manufacture of foundry iron but not for steel making. This ore lies in limestone valleys which supply abundance of flux (**529**). From the combination of these advantages, together with that of cheaper labour than in other iron-working districts of the country, this is the district in which pig and cast iron can probably be produced cheapest, and hence there is here growing up with rapid strides a town of Birmingham, with similar associations to those of the Birmingham of older and wider fame. In the same state are Sheffield, Bessemer, Anniston, and other towns engaged in the same industry. Anniston has the most extensive manufacture of cast-iron pipes in the United

and there are numerous other plants belonging to it on the borders of the states of Pennsylvania, New York, and Ohio between Pittsburgh and Lake Erie. The trust also owns vast coalfields, including the Pocahontas coalfield, extensive deposits of ore in the iron ranges in the United States round Lake Superior, railways connecting these ranges with the lake, railways connecting establishments belonging to the trust in and round Chicago, and a railway connecting Pittsburgh with the lake-ports of Conneaut (Ohio) and Erie (New York).

States. It is this district that might be expected to compete most keenly in foreign countries with the iron-producing districts of Great Britain; but it is an important element in the comparison, that its centre lies, roughly speaking, about four hundred miles by rail from the seaport of New Orleans, about two hundred and sixty from that of Pensacola, on the Gulf of Mexico. An extensive plant for the carrying on of all kinds of iron and steel industries has been erected by the United States Steel Corporation at Duluth, one of the chief shipping points of the Mesabi ores.

1304. In New England, which in colonial days, along with other parts of the Atlantic coast, supplied pig and bar iron to the mother-country, the making of pig-iron is almost extinct, but some of the cities still retain a reputation for their manufacture of iron and steel articles of high quality, such as tools and cutlery. It is in the Atlantic States that most of the imported iron-ore (nearly all ore of high quality, from Spain, Algeria, and Cuba) is utilised. The principal steel-working establishments on this coast are at Sparrow Point on Chesapeake Bay, nine miles from Baltimore, and at South Bethlehem on the Lehigh River in Pennsylvania.

1305. Notwithstanding the disadvantages of the United States for carrying on an export trade in iron and iron products (except with Canada, and to a smaller degree with other parts of America), the rapid expansion of the iron industry is easy to understand in view of the great development of the American railway system, and the extensive use of machinery of all kinds. And the fact must not be omitted that the United States carry on a large and widespread and rapidly increasing export in certain finished articles containing iron, such as agricultural implements, sewing machines, typewriters, steel bridges, machinery, locomotives, &c. In the manufacture of all these articles the iron and steel manufactures have the advantage from one cause or another of an enormous home market, favouring production on a large scale and by the most economic methods. In shipbuilding, in which the Americans have not the same advantage, they are still unable, notwithstanding the ingenuity of their labour-saving appliances, to produce as cheaply as Great Britain.[1]

1306. The precious metals of the United States are chiefly produced among the mountains in the west: gold principally on the Californian side of the Sierra Nevada and in Colorado (at Cripple Creek, about the middle of the state, and elsewhere); silver principally in the

[1] In 1900 only one steel steamship was built in the United States for the foreign trade. During the great war American shipbuilding came to the front, but the tonnage built in 1920, 2·7 million tons, showed a great decline on the figures of 1919 (4·7 million tons), while the output of British yards increased from 1·9 million tons in 1919 to 2·1 million tons in 1920. In the home trade United States shippers have a monopoly, and this has now been extended to Porto Rico, and till the time of the war ships not built in United States yards could not be included in the national register.

Rocky Mountains, in Colorado, Montana, and Nevada (see also below under copper). As to the production of quicksilver see par. **569**, and as to aluminium, **571·9**.

1307. Lime and building stone are too widely diffused for their occurrence to be particularised, and the petroleum production of the United States is treated elsewhere (**552**). Copper is produced most largely in the peninsula of Keeweenaw, which juts north-eastwards into Lake Superior (Michigan), in the south-east of Arizona, and in Montana. In this last state the copper ore is almost entirely obtained from the small district containing the mining and smelting towns of Butte and Anaconda, where metallic copper of exceptional purity is produced by the electrolytic process, which yields at the same time considerable quantities of silver as well as gold. The chief lead-producing centre of the United States is Leadville, among the Rocky Mountains in Colorado, a town which likewise produces large quantities of gold and silver. Among other important economic minerals of the United States may be mentioned the phosphate rock of South Carolina, Florida, and Tennessee, which forms a valuable manure. Natural gas occurs not only in the part of western Pennsylvania already referred to, but also in many other places; the places of most abundant production next in order being in Ohio, about fifty or sixty miles to the south of the west end of Lake Erie, and in Indiana, near the middle of the eastern frontier.[1]

1308. There is only one metal of importance in which the United States are almost entirely deficient, and that is tin. Tin ores are indeed known to exist among the Black Hills (Harney Peak), in the west of South Dakota, but it has not yet been proved whether these can be economically worked. Hence the large import of tin and tin ores, and formerly of tinplate[2]; the latter being a much-needed commodity in consequence of the large employment of tin packing-cases for American products of agriculture.

1309. With regard to the manufacturing industries of the United States in general, it is noteworthy, in the first place, that they are to a very large extent carried on with the aid of water-power. The total amount of water-power theoretically available in the United States has been estimated at upwards of 200,000,000 horse-power on an average throughout the year. Among the manufacturing towns which

[1] In 1901 there were 21,848 miles of pipe for the supply of natural gas in the United States, and the quantity produced was estimated to be equivalent in the production of heat units to 8½ million tons of coal.

[2] The heavy import duties on this commodity first imposed by the McKinley tariff in 1890, aided by the increasing facilities for the production of iron, have at last succeeded in establishing a great tin-plate industry in the United States. The production of tin-plate in the country increased from next to nothing in 1891 to upwards of 399,000 tons in 1901. Meanwhile, the import of this commodity, almost entirely from the United Kingdom, sank from about 325,000 tons to less than 53,000, and on the average of the three years before the war was less than 33,000.

benefit by the presence of water-power (in some cases called into existence by its presence) may be mentioned Lowell, Fall River, and Waltham, in Massachusetts; Nashua, in New Hampshire; Paterson, in New Jersey; Dayton and Akron, in Ohio; and Troy, in New York; the last being one of a group of manufacturing towns (including West Troy, Lansingburg, and Cohoes) which have grown up round the falls that interrupt the navigation of the Hudson (**1279**). In flour-milling (**259**) water-power is used to a very large extent. The Falls of St. Anthony, on the Mississippi River, have been the chief means of making Minneapolis (Minnesota) one of the largest wheat-markets, and probably the greatest flour-grinding centre in the world, though the industry has now grown far beyond the capacity of the falls as a source of power. Numerous flour-mills are driven by the Falls of the Genesee at Rochester (New York), by the Spokane Falls in the state of Washington, and the Falls of the Willamette above Oregon City, in Oregon.

1310. The association of water-power development with the creation and improvement of waterways has been mentioned elsewhere (**652**). Here may be mentioned an instance of this kind on the Upper Mississippi at Keokuk, at the mouth of the Des Moines River, about midway between Chicago and Kansas City, where a dam has been built across the river on a bed of smooth hard limestone. Above the dam a deep pool upwards of 40 miles in length and more than a mile wide is thus formed. For navigation a single lock available for vessels of much larger size than those now plying on this part of the river replaces the former canal of 11½ miles in length passing round the rapids above Keokuk. At the same time the dam allows of the development of 300,000 horse-power in a region embracing at the census of 1910 a population of over 2,500,000, within a radius of 200 miles. Much of the power is already transmitted to St. Louis, 137 miles away.

1311. Secondly, though American labour is high-priced, there are compensations to the manufacturer in the quality of the labour. It boasts of being the most efficient in the world, and in respect of the rapidity with which work is done the boast appears to be well founded. But though the best productions of American industry (kept up in a large measure, it must be remembered, by streams of immigrants from the most advanced seats of European manufactures) will bear comparison with any in the world, this rapidity is sometimes haste, and hence attended with imperfect workmanship. Serviceable, but not highly finished and not very lasting, is the character of the products of many an American workshop.

1312. Thirdly, American machinery is unsurpassed. It is undergoing constant improvement, through the inventiveness for which the American workman is well known, and which is partly the result of his higher education and higher intelligence, very largely the proverbial offspring of necessity. Note also as favouring some American manufactures the point mentioned at the end of par. **202.**

1313. Reference has already been made to the fact that few great American towns have grown up on coalfields (**204**; compare also **206**). Most American **towns** have owed their origin to commercial advantages, and a very large number of them to those arising from their situation on waterways (**198**), and this is applicable even to those which have developed as manufacturing towns through the utilisation of water-power (**1309**), for this advantage coincides in a great many instances with a situation at the head of river navigation. In the table on p. 646, which includes all the towns in the United States having at the census of 1920 a population of at least 150,000, the column giving the chief manufacturing industry must not be understood as indicating the basis of the town's prosperity. In most of them the chief industry is the work of distribution. In the fifth column[1] the initials 'U.A.' stand for 'urban aggregate,' the true geographical unit for towns, unfortunately not generally ascertainable from the mere consultation of census returns. An aggregate like that of New York, which includes the line of towns on the opposite side of the Hudson, might have justified the inclusion of the Oakland U.A. in that of San Francisco, but Oakland, as the terminus of trans-continental railways, enjoys in some respects superior advantages to San Francisco,[2] as is shown by its more rapid rate of growth, and it is therefore well to keep it in a separate group. As to the situation of some of the leading manufactures of the United States see pars. **377** (cottons) and **1316.**

1314. Chicago (Ill.), the largest inland town, is the lake-port for the maize-growing and hog-rearing region to the south-west, but is still more important as lying at the corner of Lake Michigan which must be turned by all the railways bringing the wheat-growing and cattle and sheep rearing region of the north-west into connection with the most populous parts of the north-east of the United States, both circumstances combining to make the town a great centre of attraction for railway traffic in other directions. It is significant that the site of Gary (Ind.), the new iron and steel manufacturing town of the United States Steel Corporation, which draws its coke from the Pocahontas field and its steam-coal from Indiana, has been selected at the extreme south of the same lake, the first point touched in coming from the south-east.

1315. St. Louis (Missouri), situated a short distance below the confluence of the Missouri and the Mississippi, and till the last decade of the nineteenth century at the lowest place on which the latter river was crossed by a bridge, has long been the chief town on one of the great western high-roads (**1283**). Minneapolis and St. Paul have grown up more recently since wheat-growing became widespread

[1] For which I am indebted to a communication by Professor Mark Jefferson in *The Geographical Review* for July 1921, pp. 437–41.

[2] Advantages about to be greatly increased by the works mentioned in the note to par. **1317**, not at Oakland proper, but at its neighbour Berkeley.

Division	Town	Population in Thousands				Chief Manufacturing Industry
		1880	1900	1920	1920 U.A.	
N.E.	Boston, Mass.	360[1]	560[1]	750	1,070	Clothing, sugar
,,	Lowell, Mass.	60	95	110	—	Cottons
,,	Worcester, Mass.	60	120	180	—	Iron wares; boots and shoes
,,	Fall River, Mass.	50	125	120	—	Cottons
,,	Lynn, Mass.	40	70	100	—	Boots and shoes
,,	Lawrence, Mass.	40	65	95	—	Woollens and cottons
,,	Springfield, Mass.	—	60	130	—	Meat packing; iron wares
,,	Manchester, N.H.	33	57	80	—	Cottons, silks
,,	Providence, R.I.	105	180	240	—	Worsteds; rubber goods
,,	Hartford, Conn.	40	80	140	—	Iron wares; small arms
,,	New Haven, Conn.	65	110	160	—	Hardware
,,	New York, N.Y.[2]	1,200	3,440	5,600	6,660	Clothing
,,	Jersey City, N.J.[2]	120	200	300	—	Sugar; tobacco
,,	Newark, N.J.[2]	140	250	415	—	Leather
,,	Paterson, N.J.[2]	50	105	135	—	Silk
,,	Albany, N.Y.	90	95	115	—	Metal wares; textiles
,,	Troy, N.Y.	57	60	70	—	Linen goods
,,	Utica, N.Y.	35	56	95	—	Hosiery
,,	Syracuse, N.Y.	50	110	170	—	Clothing
,,	Buffalo, N.Y.	155	350	510	525	Meat packing; iron and steel
,,	Rochester, N.Y.	90	160	300	—	Clothing, boots and shoes
,,	Philadelphia, Pa.	850	1,300	1,800	1,950	Sugar; leather
,,	Reading, Pa.	45	80	110	—	Steel
,,	Scranton, Pa.	45	102	140	—	Silks
,,	Pittsburgh, Pa.	240	450	590	680	Steel; glass
,,	Akron, O.	—	45	210	—	Rubber tyres
,,	Cleveland, O.	160	380	800	—	Iron and steel
,,	Toledo, O.	50	130	240	—	Foundry work
,,	Columbus, O.	50	125	240	—	Foundry work
,,	Dayton, O.	40	85	150	—	Cash registers
,,	Cincinnati, O.	255	325	400	510	Vehicles; harness
,,	Louisville, Ky.	125	205	245	—	Tobacco
,,	Detroit, Mich.	115	285	1,000	1,120	Motor cars
,,	Grand Rapids, Mich.	32	90	140	—	Saw-milling; furniture
,,	Indianapolis, Ind.	75	170	315	—	Meat packing
,,	Chicago, Ill.	500	1,700	2,700	—	Meat packing
,,	Milwaukee, Wis.	115	285	460	—	Malt liquors
,,	Minneapolis, Minn.	47	205	380	—	Flour milling
,,	St. Paul, Minn.	41	165	235	—	Fur goods; publishing
,,	St. Louis, Mo.	350	575	770	840	Tobacco; malt liquors
,,	Kansas City, Mo.	55	165	325	425	Various
,,	Omaha, Neb.	30	105	190	230	Brewing; distilling
S.E.	Baltimore, Md.	330	510	735	—	Canning; clothing
,,	Washington, D.C.	180	280	440	—	—
,,	Richmond, Va.	65	85	170	—	Tobacco
,,	Atlanta, Ga.	37	90	200	—	Cottons
,,	New Orleans, Louis.	215	290	390	—	Sugar
,,	Birmingham, Ala.	—	40	180	—	Iron and steel
,,	Memphis, Tenn.	35	100	160	—	Cotton seed products
,,	San Antonio, Tex.	—	55	160	—	Trade centre
,,	Dallas, Tex.	—	45	160	—	Saddlery
100–120°W	Denver, Col.	37	140	260	—	Lead smelting and refining
Pacific Coast	Seattle, Wash.	—	80	315	—	Flour milling
,,	Portland, Or.	—	90	260	—	Wood
,,	San Francisco, Cal.	235	345	510	—	Sugar
,,	Oakland, Cal.	—	70	215	320	—
,,	Los Angeles, Cal.	—	100	580	—	Meat and fruit packing

[1] All the figures are somewhat rounded.

[2] All these towns are in the immediate neighbourhood of New York Harbour. New York now includes Brooklyn on Long Island.

in the north-west. The mills of Minneapolis have already been noticed (**1309**). St. Paul arose as the head of continuous navigation on the Mississippi. Cincinnati (Ohio), situated at the north of the great northerly bend of the Ohio River, was the first of the great pork-packing towns. Favoured by excellent water communications, both above and below, as well as by railways, its general business and importance have continued to grow. Other great railway centres are Indianapolis (Indiana); Milwaukee (Wisconsin), the second in importance of the ports on Lake Michigan and a great focus of German immigration; Omaha (Nebraska), on the Missouri, a little above the confluence of the Platte or Nebraska River, at the crossing place of the great line of railway from New York to San Francisco; and Kansas City (Missouri) at the confluence of the Kansas River with the Missouri.

1316. As may be seen from the table opposite, the towns most rapidly increasing in population in the United States are situated principally in the west, and chiefly engaged in handling western products. The case of Chicago has long been known. About 1830 it contained only a few huts. The site of Omaha was first marked out for settlement in 1854. Duluth in Minnesota, the Lake Superior terminus of the Northern Pacific Railroad, had in 1875 a population of 2,500. Being the lake-port for the United States portion of the Red River Valley, its receipts of wheat are already in excess of those of Chicago. It is likewise a place of shipment for some of the iron ores of north-eastern Minnesota (**1301**), and it has already started smelting works for the silver, copper, and lead ores of the region traversed by the railway above mentioned. Remark may also be made on the rapid growth of Detroit, Akron, and Dayton, whose leading industries may be taken as illustrations of the more or less arbitrary selection of particular sites for manufactures of a certain type spoken of in par. **203.** It may be mentioned, however, that the leading Detroit industry came as a natural successor to the manufacture of wooden vehicles favoured by the abundant supplies of timber and the favourable situation for distribution. It scarcely needs to be pointed out that the rubber tyre industry of Akron develops hand in hand with Detroit's automobile manufacture.

1317. At the close of the nineteenth century the following were the ten leading **seaports** in order of importance as determined by the amount of tonnage entered and cleared in the foreign trade: New York, Boston, Philadelphia,[1] New Orleans, Baltimore, Puget Sound, San Francisco,[2]

[1] A 31-foot channel in the Delaware is maintained with difficulty as high as Philadelphia.

[2] From the first San Francisco has suffered from the drawback of being severed from the continental portion of the United States by a shallow inlet. At last a company called the Pacific Port Terminal has been formed to dredge a deep channel, and in alliance with the city of Berkeley, immediately opposite the Golden Gate, as the entrance to the inlet is called, to provide extensive quayage at that city for ocean shipping. For a considerable time past Berkeley and the contiguous city of Oakland had been growing at a more rapid rate than San Francisco.

Galveston, Newport News, and Mobile. In respect of the amount of its foreign commerce New York is without a rival, for on the average of the years mentioned the tonnage entered from foreign countries at that port was 48 per cent. of the whole; that cleared for foreign countries rather more than 46 per cent.

1318. The physical conditions present great difficulties in the way of providing commodious harbours at all the ports on the Gulf of Mexico. The hinderland of New Orleans[1] is one of the largest in the country, and has been made much more valuable by the development of railways by means of which the great bulk of the traffic is now carried on. The structure of the Appalachian system has facilitated the construction of railways connecting it with New York, but a much more important connection is established by the Central Illinois Railroad with Chicago, 912 miles distant, nearly due north. By this line there is a large trade from New Orleans in bananas and other imported fruit, as well as in garden produce grown in the neighbourhood of New Orleans in the early months of the year (from January onwards), and from July onwards the same kind of produce is carried the other way—from the northern states to New Orleans. Galveston has with difficulty been provided with a navigable channel across the bar of a depth of between 28 and 29 feet, and 20 to 25 feet of water at the berths. Having the advantage of being only 2,130 miles from San Francisco, as against 2,480 miles, the distance between that port and New Orleans, it has been made the principal Gulf port of the great railway system of the Southern Pacific Railroad. Before the opening of the Panama Canal large quantities of Hawaiian sugar were conveyed from San Francisco to Galveston even for New York and other eastern seaports. (Comp. **1232** and **1252.**) The wharves at Mobile can be reached only by vessels drawing no more than 21 feet.

1319. Among the minor seaports of the United States may be mentioned Newport (Rhode Island), Washington (D.C.), Richmond (Virginia), a great tobacco port, Wilmington (North Carolina), Pensacola (Florida), chiefly a timber port, Wilmington (southern California), Portland (Oregon), a great wheat port of rising importance; Tacoma (Washington), on Puget Sound, one of the termini of the Northern Pacific Railroad. Pensacola has one of the best harbours on the Gulf, having a depth on the bar of 32 feet and from the bar to the dockyard

[1] At this port, which now ranks next after New York among the ports of the United States, the difficulties referred to have been admirably surmounted. Since 1903 the Port Commissioners have expended nearly 15 million dollars in improvements. A channel of 36 feet in depth is maintained as high as New Orleans (and, indeed, as high as Baton Rouge, 25 miles up) from the South-west Pass. Five canals with a minimum depth of five feet connect it in different directions with the neighbouring lakes and bayous. There are grain elevators with a total capacity of above seven million bushels, and cotton warehouses with a capacity of 425,000 bales. The city is now the largest market in the United States for gunny cloth, rice, bananas, cotton, and molasses, and has a great sugar-refining industry.

of 30 feet, with accommodation at the town wharves for vessels of from 16 to 22 feet. Tampa, on the west coast of Florida, is a great seat of cigar factories and a place of export of rock phosphate. Key West on a small island at the southern end of Florida, which forms the southernmost of a chain of keys 140 miles long, and since January 1912 has been connected by rail with the mainland and is the starting-point of a train-ferry to Havana, is a first-class naval base and another important seat of tobacco manufactures. As to Hampton Road ports see par. **1230.** The fisheries and fishing stations of the United States are treated of elsewhere (**501**).

1320. The foreign shipping at American seaports is mainly under foreign flags, the United States flag being represented on the average of the five years 1881-85 by barely 20 per cent. of the whole.[1] By far the largest share belonged to the British flag; those of Germany, Norway, and Italy then coming next after that of the United States itself. Formerly the chief reason of this inferiority of the native flag in foreign commerce was the fact that no vessel was allowed to be registered as belonging to a United States owner unless built in the United States (comp. **1305**). This disability was removed by an Act of Congress in August 1914, but the higher wages of American crews still remain an obstacle to competition with other countries in the carrying trade to and from foreign countries. From Table I, under the heading Tonnage of Merchant Navies, in the Appendix, it will be seen that after 1860, not only the proportion of the merchant shipping of the United States to that of the United Kingdom declined, but that that merchant shipping declined absolutely. This was a natural consequence of the two changes which began to be rapid about that date—from wood to iron (afterwards steel) in shipbuilding, and from sail to steam. The first change deprived the United States of its special advantage in shipbuilding material, the second caused the cost of the service of the shipping to be much greater than before, relatively to the cost of ship-production, and so to make the highly paid American labour a hindrance in competition for the carrying trade. The coasting trade of the United States is still reserved to the nationals of that country, and is largely conducted in sailing vessels (**171**).

1321. Here it may be stated that this inferiority in the shipping of the United States is part of the explanation of the large excess of exports over imports, which the tables in the Appendix show in recent

[1] The percentage of the imports and exports of the United States carried in vessels registered in the country amounted in the year ending June 30, 1860, to 66·5; in 1870 to 35·6; in 1880 to 17·4; in 1900 to 9·3; in 1914 to 9·7; but in the year ending June 30, 1918, to 21·9; and in that ending December 31, 1919, to 36·1 per cent. These figures include the shipping of the great lakes. The total amount of shipping engaged in the foreign trade flying the American flag reached in the year ending June 30, 1914, less than 1·1 million gross tons; in that ending June 30, 1919, 6·67 million.

periods before the war. The cost of transmarine carriage **must** be borne to a larger extent by the United States than by foreign countries, and this extra cost is represented by the excess of exports. This, however, cannot be regarded as the whole explanation of the difference there brought out. Part of the explanation may be found in the unrecorded import of specie brought by immigrants (though this is at least partly balanced by similar unrecorded exports), and possibly also the figures now under consideration indicate that there is no longer an excess of money imported for investment in the United States, but that, on the other hand, there is now an excess repaid to foreign countries by way of interest on investments.[1]

1322. The United States possesses the **outlying territories** of Alaska, the Hawaiian Archipelago, Porto Rico, the Panama Canal zone, the Philippine Islands, the Virgin Islands, and the small Pacific islands of Guam and Tutuila in the Samoan group. Most of these were acquired from Spain in 1898, and in the same year the Hawaiian Archipelago was acquired. Alaska, Hawaii, and Porto Rico are included within the customs territory of the United States. Alaska lies to the north-west of the Dominion of Canada, and was acquired from Russia by purchase in 1867. It has an area more than six times that of Great Britain, and is traversed by a magnificent river, the Yukon, but produces commercially little besides furs, salmon, and gold. The gold deposits are at Nome on the north side of Norton Sound nearly opposite the mouth of the Yukon, on Douglas Island (the Treadwell Mine), opposite Juneau in 58° 15′ N. (where quartz-mining has long been carried on), and elsewhere. The Nome deposits, discovered in 1898, are by far the most important. Coal is known to exist on several of the islands fringing the mainland to the south of the fifty-eighth parallel of latitude, but is not worked; but in 1903 a report was issued on important seams of a hard bituminous coal discovered at a distance of from 12 to 25 miles inland from Controller Bay just north of the sixtieth parallel, and west of 144° W. The total population of the outlying territories in 1920 was above 12,000,000.

[1] The war has, of course, reversed this position.

MEXICO AND CENTRAL AMERICA

1323. MEXICO. In almost the whole of America from the northern boundary of Mexico southwards the influence of the peoples of the Iberian peninsula, chiefly the Spanish people, is predominant. It is they who have determined the official languages and the speech of the educated classes, who have given their stamp to the religion, laws, and customs. Mexico is a country with a government nominally similar to that of the United States. Its territory, though between eight and nine times the size of Great Britain, is in the north a continuation of the arid and desert region in the south-west of the United States, and the densest population is found on the narrower portion to the south of the Tropic of Cancer, and more particularly on the **tableland of Anahuac.** It will be observed from the map on p. 653 that all the chief towns situated on this tableland are upwards of 6,000 feet above sea-level. Further north the general elevation sinks to between 3,000 and 4,000 feet. Everywhere in proceeding from the coast to the tableland of Mexico, that is, everywhere north of about latitude $18\frac{1}{2}°$ N. (see the map on p. 653), one has to ascend a height of more than 3,000 feet within a distance of from fifty to two hundred miles in a direct line, the ascent being greatest and most rapid where the population is densest and communication with the seaboard of most importance. The tableland, moreover, is bordered by mountains, which causes the ascent to be higher than is indicated by the elevation of the towns lying on its surface. On their outer slopes these mountains present to view an extremely diversified surface. Numerous minor spurs enclose larger or smaller valleys at different elevations. The general height of the mountains to the south of the tableland sinks as the mainland narrows to the isthmus of Tehuantepec, from which another mountainous region rises as the mainland widens again on the other side. The greater part of the isthmus is under 1,000 feet in height, and in the lowest section across it the highest elevation is below 800 feet. The general character of the superficial configuration together with the abundance of rainfall where the slopes are exposed to ocean winds affords many opportunities for the development of **water-power,** which is already turned to account at several places and will become more important as population condenses. The two peninsulas of Mexico contrast with one another in their superficial features. Yucatan consists almost entirely of low plains, and is nowhere above 1,000 feet in height. Lower California is a miniature repetition of the mainland

of Mexico in so far as it consists of an interior tableland bordered by low coast strips.

1324. As might be expected from the character of the surface just described, the **difficulties of communication** have long been one of the chief obstacles to the development of the country. Not many years ago travellers bound from the capital to Acapulco, on the Pacific Coast, were known to proceed first to Vera Cruz, thence by sea to New York, from New York to San Francisco, and thence again by sea to Acapulco, rather than attempt the land journey of three hundred miles. Till January 1, 1873, when the railway from the city of Mexico to Vera Cruz was inaugurated, there was no railway communication between the interior of the tableland and the sea. Before reaching the plain of Mexico this line has to ascend to a pass upwards of 8,200 feet in height within a distance of about eighty miles in a direct line from the coast. Where the gradient is heaviest on this line only about ten loaded wagons can be drawn up at once. On the surface of the tableland railway construction naturally presents fewer difficulties, and it will be seen from the map opposite and the notes printed on it that there are now three different routes by which the city of Mexico is connected with the railway system of the United States. The first of these railways constructed was the Mexican Central, which forms the direct communication with San Francisco and was opened in 1884. Though railway construction is easier on the tableland than between the tableland and the coast, yet the heights given on the map for some of the chief towns show that the surface even there is far from being level or even presenting a tolerably uniform slope. It is crossed and re-crossed by mountains and valleys, especially in the south, and here and there has somewhat extensive relative depressions. In consequence of this inequality of surface the National Railway (see map) soon after leaving Mexico climbs to the height of nearly 10,000 feet above sea-level before descending into a valley situated about 1,220 feet higher than that of Mexico. The Central Railway passes through Zacatecas at the height of somewhat more than 8,000 feet, reaches a still higher elevation further north, afterwards descends to a valley about 3,700 feet in height, to rise again to a height of more than 4,500 feet, and then to descend once more to the height of 3,700 feet on the frontier.

1325. The **climate** and vegetable productions of Mexico vary greatly according to the height and the situation. The low-lying coast strips on both sides of the tableland are mainly marshy tracts with a hot malarious atmosphere such as characterises tropical coasts in most other parts of the world. The hot region, in which bananas and other tropical fruits, sugar-cane, coffee, cacao, tobacco, and vanilla are the principal objects of cultivation, and forests, yielding valuable cabinet and dye-woods, clothe the mountain slopes, extends upwards to about 4,000 feet above sea-level. Between about 4,000 and 4,500 feet is the belt which forms pre-eminently the temperate region, where the

Longmans Green & Co., London, New York, Bombay & Calcutta.

climate is that of an eternal spring, and all the products of the warmer part of the temperate zone, including tobacco, flourish luxuriantly. In a wider sense the temperate zone reaches upwards to a height of about 7,000 feet, the elevation at which forests of pines and firs, characteristic of the cold region, become predominant. The so-called cold region, which includes the southern and higher parts of the tableland is, however, cold only by comparison. Real winter temperatures are experienced only at places situated at exceptionally high elevations. The prevailing crops on the tableland are maize (which furnishes, along with a kind of beans, the staple food of the great bulk of the population), wheat, barley, and other cereals, and the agave or maguey (the so-called American aloe), from the juice of which is obtained the favourite Mexican drink called pulque.

1326. As regards rainfall, the whole of Mexico is characterised by the tropical alternation of dry and rainy seasons, the latter occurring in the summer of the northern hemisphere. On the lowlands and mountain slopes bordering the tableland these rains are abundant, but on the surface of the tableland they are in most parts scanty (**64, 944, 1047**). Only in the south of the tableland are they sufficiently copious to maintain a vigorous vegetation. As one approaches the tropic of Cancer the rainy season becomes shorter and the amount of the rainfall at any period scantier. Irrigation becomes absolutely necessary for cultivation, and great irrigation schemes are constantly being proposed. Still further north the climate is even drier. The spiny shrubs and herbs characteristic of arid regions generally constitute almost the sole vegetation. Artesian wells (**98**) have to be sunk to supply the locomotives with water. Only the valleys and hollows above referred to allow of sufficient accumulations of water to render cultivation and the rearing of live-stock possible by irrigation. Some of these hollows, however, produce excellent wheat and other cereals as well as cotton. An extensive relative depression of great productiveness is traversed by the International Railway in the hundred miles before its junction with the Central. This promising region is known as the Laguna district. The peninsula of Yucatan is too far from the condensing influence of the mountains to enjoy a copious rainfall, so that the characteristic vegetation consists of fibre-plants, which thrive in a dry climate, and which are now furnishing a more and more important article of export (**440**). The tableland of Lower California is of the same arid character as the mainland in the same latitude.

1327. Hitherto the wealth of Mexico in **minerals** and above all in silver, and to a less extent in gold (**558**), has furnished the most important Mexican exports. It is these commodities that could best bear the heavy cost of transport. But Mexico has other mineral deposits. In recent years by far the most important of these has been petroleum, which is found in different places, but chiefly within a zone of about

200 miles in length with an extreme width of 50 miles along the west shore of the Gulf of Mexico, the chief ports of the district being Tampico and Tuxpan.[1] Coal is produced only in small quantity—in the state of Coahuila. The iron marked at Durango is in the form of a mountain of ore of unusual purity, called the Cerro del Mercado, upwards of 8,500 feet in height. Durango is now connected by rail with the Mexican International Railway, and large and profitable iron and steel works exist both there and at Torreon, where that railway crosses the Mexican Central. Other works of the same kind exist at Monterey and elsewhere in the republic. Fine marbles and other beautiful building materials are also among the minerals of Mexico.

1328. The Mexican **exports** next in value to the precious metals are dye-woods and fine cabinet woods, fibres, chiefly henequen (see map and **440**), vanilla, coffee, tobacco, hides, and medicated roots. Sugar and cotton are grown mainly for home consumption. The imports are such as characterise undeveloped countries generally—textiles, leather wares, iron wares, and other manufactured goods. It is to be noted, however, that a large amount of raw cotton is imported from the United States, many cotton factories having been established to make use of the abundant water-power on the outer slopes of the mountains, chiefly in the neighbourhood of Vera Cruz. The tables in the Appendix (p. 754) show the relative importance of different countries in the foreign commerce of Mexico. It will be observed that the export table shows a great decline in the trade of the United Kingdom relatively to that of the United States. This decline is due mainly to the construction of the railways establishing connections with the railway system of the United States. Though smelting works are being rapidly multiplied in Mexico itself, large quantities of ores are still sent to the United States to be smelted, and the same country receives the largest proportion of the metals when smelted. The import table shows, on the other hand, that the United Kingdom more than holds its own in this branch of the trade, and the improvement under this head may be ascribed to the improvements in the Atlantic ports of Mexico, and more particularly to the establishment in 1891 of railway connection between Tampico and the Mexican Central Railway.

1329. The traffic carried by these northern railways is mainly through traffic, originating in or destined for the more populous portions of the tableland. The nature of the climate and the scantiness of the population are obstacles to the development of commerce with the parts of Mexico nearer the United States frontier. But it is to be borne in mind that there are other parts of the world in which a large commerce is carried on by a relatively scanty population, and wool, the commodity of most commercial importance among those which can be

[1] The making of a pipe-line across the Isthmus of Tehuantepec, near the northern end of which there is a detached oil-bearing area, is contemplated. The total production of oil was in 1913, 900 million gal.; in 1919 above 3,200 million.

produced by a small population, is one for which the northern parts of Mexico would appear to be well suited, wherever there is a sufficient amount of water. The neighbouring parts of the United States, with a similar climate, have at any rate shown themselves to be well adapted for the rearing of sheep with a fine fleece. No doubt fine-woolled sheep could be reared as well on certain parts of the tableland of Mexico as on the interior pastures of Queensland in corresponding latitudes, if proper attention were given to this branch of industry. The success of the industry commercially would probably depend, however, on the extent of available land sufficiently well watered.

1330. Of the **seaports** of Mexico the most important is Vera Cruz, where the bulk of the foreign commerce of the country (especially in the import trade) is still carried on. The harbour at this port has been so improved that there is now an average depth of 36 feet at the entrance, and one of 33 feet alongside of the deep-water jetty. Other quays and piers have a depth alongside of 28 feet. Tampico harbour, which formerly could not be entered by vessels drawing more than 9 feet, is now accessible for vessels of about 20 feet draught, and is well provided with jetties and wharves. Larger vessels can load at Tuxpan or Tuxpam. Acapulco, on the Pacific coast, has an excellent natural harbour. It is the place from which a galleon used to be dispatched annually laden with silver for the Crown of Spain. Some Pacific steamers call here regularly, but the amount of trade is very limited, and will probably continue to be so as long as the projected railways connecting it with the interior remain uncompleted. Guaymas, a port on the Gulf of California (outside the map, in lat. 28° N.), has a good natural harbour directly connected with the railway system of the United States by a line of railway passing through several productive hollows in the province of Sonora. Harbours with a depth of 33 feet and with quays and wharves provided with the best modern appliances for the handling of cargo have been constructed at Salina Cruz on the Pacific side and Puerto Mexico (formerly Coatzacoalcos) on the Atlantic side of the isthmus of Tehuantepec. The railway across that isthmus has also been improved, with the view of making it part of a great trade-route connecting the two great oceans. (See par. **1230.**)

1331. The city of Mexico is the seat of the general government and the most populous town in the country. Next in population is Puebla, which is the centre of a district rich in minerals, including coal and various fine kinds of stone, as well as in vegetable products Besides Mexico and Puebla, Guadalajara, San Luis Potosi, Monterey, and Leon have all upwards of 50,000 inhabitants. (See also **216.**)

1332. CENTRAL AMERICA. This includes the six republics of Guatemala, San Salvador, Honduras, Nicaragua, Costa Rica, and Panama,

Mexico . . .	1,100,000	San Luis Potosi . .	70,000
Puebla . . .	180,000	Monterey . . .	75,000
Guadalajara. . .	120,000	Leon	60,000

besides the Panama Canal zone belonging to the United States. Panama was formerly part of the South American republic of Colombia, but declared its independence on November 4, 1903, and a few months later made a treaty with the United States, ceding the zone mentioned. The largest of the republics have an area of little more than half that of Great Britain. Their surface is similar on the whole to that of southern Mexico. Their chief products are coffee (for which soil and climate are excellently adapted), tobacco, and tropical fruits, in which last a large trade with the United States has been developed. Communications, still very defective, are being improved, and concessions have been granted for railways to connect all the capitals, as well as for new lines to cross from ocean to ocean.

1333. The Panama Canal zone, ten miles in width, contains the only inter-oceanic railway in Central America, the oldest inter-oceanic railway in the world, as well as one of the two great inter-oceanic canals (p. 760). The railway, 47½ miles long, connects Colon or Aspinwall in the north with the town of Panama in the south, and was opened on January 28, 1855. The canal, begun by a French company floated in December 1880, and completed by the United States, virtually connects the same two places as the railway, though the name of Balboa has been given to the new town on the canal immediately to the west of Panama. The canal has a length of 50½ miles,[1] and a minimum depth of 41 feet. Its highest part is where it passes through an artificial lake, 85 feet above sea-level, known as Lake Gatun, which not merely feeds the three locks but also affords power to a large electric station. The canal was opened to traffic on August 15, 1914. Since its opening landslips from the steeper side of a cutting on the Pacific side of Lake Gatun have on several occasions interrupted the service through the canal. As may be seen from the table in the Appendix, p. 760, the larger part of the cargo carried through the canal is from the Pacific to the Atlantic, which is accounted for by the fact that grain and Chilean nitrate are the principal commodities which pass through it. Other important commodities are timber (from the Pacific side), coal, petroleum, raw cotton, and iron and steel wares from the Atlantic side. Under a treaty concluded between the United States and Great Britain in 1901 traffic through the canal is open to all nations on equal terms.[2]

1334. The west coast of Central America is cliffy, and has the best harbours. The eastern shores are mostly low and swampy, and the harbours generally encumbered by bars. It is on this side, however, that most of the trade is carried on, the British Isles and the eastern ports of the United States being the parts of the world that have the bulk of that trade. The best seaport on this side is Belize, the port of British Honduras, a Crown colony, with an area about equal to that

[1] Under 44 nautical miles.

[2] Agitation against this provision is, however, still (1921) maintained by an influential section in the United States.

of the counties of York and Durham taken together, and a population of about 38,000. It is the place of export of a great deal of mahogany and other cabinet woods, together with logwood and other dye-woods. The chief of the other ports on this side are Truxillo (Honduras), Bluefields, and Greytown (Nicaragua), Puerto Limon (Costa Rica). From some of these ports there is a growing trade in fruit (bananas, &c.) with the United States. (See also **216.**)

THE WEST INDIES

1335. This group of islands has an aggregate area not much larger than that of Great Britain, with a population of about 5,000,000, the two largest islands, Cuba and Haiti, being very thinly peopled. The larger islands, in the west, are known as the Greater Antilles; the smaller islands, in the east, as the Lesser Antilles.

1336. The Bahamas are flat coral islands, the seas surrounding which produce sponges. All the other islands are mountainous, and the mountains and higher parts of the surface generally are covered with dense forests, which yield cabinet- and dye-woods to commerce. Hurricanes sometimes render the navigation both of the Atlantic and the Caribbean Sea dangerous in the period from July to October, and especially in September, when the sea is at its hottest and the winds are very variable.

1337. The **population** is almost entirely descended from natives of other continents, the aboriginal population having been nearly exterminated within a short period after the discovery of the group by Columbus. A very large proportion of the inhabitants are the descendants of negroes, originally slaves, but now all free. Indian and Chinese coolies have been introduced as labourers since the liberation of the negroes, on account of the unwillingness of free negroes to work. The rapid increase of the negro population is, however, gradually doing away with the difficulty of obtaining plantation and other labourers.

1338. Political relations. The majority of the islands owe allegiance to European powers—Great Britain, France, the Netherlands—but the two largest islands as well as Porto Rico and the small Virgin group are now in the possession or under the influence of the United States. Porto Rico is so far incorporated with the United States as to have a representative in Congress and to be included in the customs territory of that country. Cuba and Haiti are republics under the protection of the United States, and since November 1916 the nominal republic of Santo Domingo has been under a United States military governor. The Virgin Islands were formally taken over by the United States by purchase from Denmark, on March 31, 1917.

1339. Cuba [1] has a somewhat elevated interior, but the only important mountain range is that which rises from the south coast in the

[1] Population, by census of 1919, 2,900,000, of whom 26 per cent. were coloured (negroes, persons of mixed blood, and Chinese). In 1841 this section of the population formed 58 per cent. of the total.

east, the Sierra Maestra. There is a considerable extent of coast swamps, but the greater part of the coast-line is formed by coral reefs, in which the action of small rivers had formed at intervals a number of excellent nearly land-locked harbours, the only drawback to which is that where towns exist beside them they are apt to be silted up with pestilential mud. Under Spanish rule sanitation was wholly neglected, but matters were greatly improved in this respect during the military occupation by the United States in 1898–1902.[1] The most populous part of this island is in the west, where there are several railways supplemented by very bad roads, and where on the north coast stands Havana, the capital of the island, and the only large town in the whole archipelago. It is situated on a fine bay, and has an excellent natural harbour. The chief plantation products of the island are sugar (**425**) and tobacco (**383**). Valuable iron mines are worked in the Sierra Maestra at Juragua and other places between the excellent port of Santiago de Cuba and Guantanamo, and deposits of copper said to be of enormous value exist at Cobre to the west of Santiago, though these deposits have not been worked since 1868. Commerce generally is greatly stimulated by a reciprocity treaty with the United States.

1340. Porto Rico[2] was acquired by the United States from Spain in 1898. Sugar and coffee are the two principal products of the island, but there are other tropical products, and cattle-rearing is an important industry. The capital is San Juan on the north side, the chief commercial town on the south coast, Ponce.

1341. British Islands. The total area of these is a little more than 12,000 square miles, and the population under 1,500,000.

(1) Jamaica, an island about two-thirds of the size of Yorkshire, south of eastern Cuba, capital and chief port Kingston; (2) the Bahamas; (3) the Leeward Islands—the Virgin Islands (part of the group), St. Christopher (St. Kitts), Nevis, Antigua, Montserrat, and Dominica; (4) the Windward Islands—St. Lucia, St. Vincent, Grenada (with the Grenadines); (5) Barbados; (6) Trinidad and Tobago, the former an island lying opposite the delta of the Orinoco, the latter a little to the north-east. In almost all of them sugar takes an important place among the exports, but cacao and spices are the chief products of Grenada, and since 1885 fresh fruits have risen to the first place among the exports of Jamaica. Cacao is also largely grown in Trinidad, Dominica, and St. Lucia; Montserrat is well known for its lime-juice; and Antigua has a large trade in pine-apples. The fruits mainly exported from Jamaica are oranges, bananas, and coconuts. The principal market is the United States, but a successful

[1] It is claimed that for the first time in the history of Havana yellow fever was not epidemic in that city in 1901.

[2] Population in 1900, 953,000; 1920, 1,300,000.

Havana	360,000	Guantanamo	70,000
Santiago de Cuba	70,000	Kingston	60,000

trade in Jamaica fruit has also been started with the United Kingdom. In the drier districts of Jamaica and other islands sisal hemp (**440**) is increasingly cultivated. The chief port for the fruit trade is Port Antonio on the north coast, which is only about 1,500 nautical miles from New York as against 4,350 miles from Liverpool. From 1900 to 1910, however, the fruit trade with the United Kingdom was stimulated by a bounty[1] granted to a steamship company for maintaining a direct trade with Jamaica by means of ships provided with refrigerating apparatus suitable for the trade. Among the mineral products of the group are asphalt, obtained from a large lake in the interior of Trinidad; phosphates from Sombrero, a small island to the east of the Virgin group; and salt from the Turks Islands, a dependency of Jamaica in the south-east of the Bahamas.

1342. Other Islands: Guadeloupe and Martinique, with some smaller islands, and half of St. Martin, belong to the French. The products are similar to those of the British Islands. The three considerable islands of Curaçao, Aruba, and Bonaire (or Buen Ayre), off the north coast of Venezuela, together with two smaller islands, and half of St. Martin, among the British and Leeward Islands, belong to the Dutch. The importance to the United States of the acquisition of the Virgin group lies in the fact that the principal island, St. Thomas, has a fine harbour, with the port of Charlotte Amalie lying on the direct route from the Atlantic end of the Panama Canal to Europe. In former times this port, having been made by the Danes a free port more than a century ago, became the chief depôt for the West Indian Islands and the east coast of South America; but this trade dwindled away when direct steamer routes were established in increasing numbers between West Indian and South American seaports and those of Europe and America. It is now, however, likely once more to become an important *entrepôt*.

[1] The bounty amounted to £40,000 a year, half of it being paid by the United Kingdom, the remainder by the colony. The British ports with which this trade is at present carried on are Bristol and Manchester. Since the bounty ceased to be paid the trade has been taken up by an independent company.

SOUTH AMERICA

1343. This, the smaller half of the New World, has at least four-fifths of its area within the tropics, and hence yields chiefly tropical products ; but here as elsewhere the temperate area, relatively to its extent, furnishes a greater abundance of commercial commodities, and it is in this part of the continent that the rate of increase in the production of such commodities, and the development of means of distribution for them, are now most rapid, and European immigration is most constant.

1344. The lofty chains of the Andes, on the west side of the continent, form an important climatic barrier. In the latitudes in which the trade winds prevail (**52**) they arrest the moisture-laden winds from the Atlantic, draining the moisture out of winds that had already been partly drained in their course over the continent further east (**64**). The western slopes of these mountains, on the other hand, receive in these latitudes no rain from the Atlantic, and as far as 33° S. little or none from the Pacific. On that side the tendency of the wind is to blow away from the land (**52** ; comp. **1376**), and the rarefaction of the air on the narrow strip west of the Andes is not enough to counteract that tendency. The Andes also constitute a great obstacle to communication between the east and west coasts. More than one railway reaches a height of upwards of 14,000 feet before attaining the table-lands between the principal chains of the mountains. Here also applies the remark made in par. **1323** as to the probable increasing importance of water-power with the growth of population.

1345. Some of the mighty rivers to the east of the Andes form excellent waterways. The Orinoco, in the north of the continent, is navigable for steamers continuously for nearly a thousand miles. The Amazon is navigable without interruption to the base of the Andes, a distance of 2,600 miles from its mouth, and 50,000 miles of navigation are afforded by the main stream and its tributaries great and small. Many of these tributaries, however, have their navigable course greatly obstructed by falls and rapids ; so, for example, the Xingu and Tapajos on the right bank, the upper Rio Negro on the left. The Madeira is continuously navigable for steamers to beyond 8½° S., but there then follows a series of falls and rapids extending over a distance of two hundred miles, interrupting the communication between Bolivia and Brazil. Since 1912 a railway completes the communication

between these two points. The Araguaya and Tocantins, which enter the Rio Pará (a southern arm of the Amazon) in one stream, both have their navigation more or less obstructed in the same way—the Tocantins to such an extent that the large boats which ascend the river from the town of Pará to about 13° S. take about ten months in ascending, against two months in descending. Falls and rapids likewise beset the course of the Rio São Francisco, and those of all the other rivers of the mountainous part of eastern Brazil, including that of the middle Paraná. The value of the navigation of the Amazon is diminished by the paucity of population and products in the region through which it flows and by the similarity of the products in nearly the whole of its navigable course. The sole important article of trade is rubber (**447**). The inland waterway which is already of most importance and likely to remain most useful to commerce in the future is that from north to south formed by the upper Paraguay and the lower Paraná, a waterway which is uninterrupted from near the source of the former river, and which, like the Mississippi, brings hot and temperate climates into direct communication.

1346. The population is still very scanty, probably not more than 65,000,000. Whites of pure blood form only from two- to three-tenths of the whole, negroes about one-tenth, and the remainder are either native Indians or people of mixed race ; so that on the whole the Indian element still largely predominates. The white population in Brazil is of Portuguese origin, and Portuguese is there the official language ; but elsewhere, except in Guiana, the whites are mainly of Spanish descent, and Spanish is the official language.

1347. The division of languages in South America is mainly the result of the award made in 1494 by a commission appointed by Pope Alexander VI., which met at Tordesillas, near Valladolid. That commission assigned all newly discovered regions not already in the possession of Christians to Spain and Portugal, Spain to have all those to the west, Portugal all those to the east of the meridian lying 370 leagues to the west of the Cape Verde Islands. In virtue of this award Portugal claimed the coast of Brazil, when a Portuguese navigator, Cabral, touched on a portion of that coast in 1500. The remainder of South America was claimed by Spain. Nevertheless Dutch, English, and French settlements were made on the coast of Guiana early in the seventeenth century, but the English have been in continuous possession of British Guiana only since 1803, when it was taken from the Dutch during the wars of the Napoleonic period.

SOUTH AMERICAN STATES

1348. BRAZIL, formerly an empire, but declared a republic after a revolution in 1889. In size it is the rival of the United States and Canada. The limited area already turned to account for **agriculture** is roughly indicated on the accompanying railway map, on which the names of the chief products are likewise inserted. Even the area which travellers deem it possible to bring under cultivation at some future time is but a small fraction of the whole. The equatorial valley of the Amazon is filled with dense swampy forests. Among them, however, suitable sites have been found for the establishment of rubber plantations.[1] Close to the coast that trends in a south-easterly direction, stretch ranges of mountains which cut off the Atlantic moisture from the region behind. This region is made up mainly of low tablelands (*campos*) with a sterile soil. North of about 20° S., that is, throughout the broader part of the country south of the forests, these *campos* are considered fit for nothing but pasture (**82**). There remains nevertheless an area in the south—small, indeed, compared with the extent of the empire, but yet between four and five times the size of Great Britain—in which there are many fertile districts still unsettled, and a considerable extent of these in latitudes fit for European settlers. Till recently the practice of slavery deterred free immigrants from settling in those provinces in which the institution was most firmly established (those growing tropical products), but from 1871 it was in process of abolition, and it was entirely abolished in 1888. Great efforts are hence being made by the Brazilian government to attract **immigrants** to those districts in which a substitute for slave-labour is most needed. Immigrants, chiefly Italian and Portuguese, are now arriving in thousands. In the southernmost provinces, where slavery was never very general, German and Italian colonies have existed for many years. In recent years the working of **minerals** and the carrying on of **manufactures** have been growing in importance. The old gold mines of Ouro Preto and the diamonds of Diamantina in the state of Minas Geraes are no longer of any consequence, but in the same province a little to the north there lies what is said to be the greatest reserve of iron ore in the world suited to the acid Bessemer process, deposits mainly composed of hematite and magnetite containing more than 60 per cent. of iron. Though the deposits are mainly in situations very difficult of access, working has begun at

[1] Area in 1905 about 100,000 acres; in 1919 nearly 3,000,000.

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Sabara and Itabira.[1] Extensive and promising oil-fields have been discovered in the north-east between Pernambuco and Bahia. Sugar refineries exist both in the federal district in and round Rio de Janeiro and at Pernambuco; and textile industries are growing vigorously—chiefly in the federal district.[2] Railways are so far most numerous in the coffee region of Brazil (**407, 408**). See also par. **447** and the tables of imports and exports in the Appendix, p. 755.

1349. The capital of the republic is Rio de Janeiro, which is also the chief seaport. Its harbour is admirable on account of its commodiousness and safety, and delightful on account of its beauty. Santos, further south, now surpasses it in the export of coffee. Bahia, or San Salvador, and Pernambuco[3] are the seaports of the region producing sugar, cotton, and tobacco; Pará, Maranham,[4] and Ceará, those of the region yielding forest products—rubber, Brazil nuts, cabinet and dye woods, together with cacao and sugar. The ports of the temperate region yielding animal products are Rio Grande do Sul, Pelotas, and Porto Alegre, all of which are accessible only to vessels of small draught (under eleven feet), on account of a bar at the entrance to the shallow lagoon on which they all stand.

1350. COLONIAL GUIANA consists of three portions—one British, about equal to Great Britain in size; one Dutch (Surinam); and one French (Cayenne). Cultivation of plantation products (chiefly sugar-cane) is almost confined to the British and Dutch colonies, and in these to a strip of lowlands along the coast and the river-banks, a strip partly below sea-level, and protected by embankments. In British Guiana Demerara is the chief sugar district. The labourers are negroes, mulattoes, and coolies. In British Guiana a native bush, known to botanists as *Sapium Jenmani*, is said to produce a rubber little if at all inferior to Pará rubber. In all the three divisions of this region gold is an important product, above all in French Guiana, where alluvial gold workings form the chief industry. Cayenne is used by the French as a place of deportation for convicts.

1351. VENEZUELA, a republic in the north of the continent, consisting chiefly of the basin of the Orinoco (**1345**). People of Spanish, Indian, and negro descent, all now free, make up the bulk of the population; and the majority are settled on a small area of highland valleys in the north-west, where branches of the Andes strike north-eastwards, and then eastwards parallel to the coast. The staple product is coffee;

[1] Now (1921) being connected by rail with the port of Santa Cruz, just N. of 20° S.

[2] These industries have contributed with agriculture to promote the very rapid growth of population which marked the first twenty years of the twentieth century. Between the censuses of 1900 and 1920 the average annual rate of increase was 3·25 per cent. as against 1·74 per cent. in the Argentine Republic between the censuses of 1895 and 1914. Comp. also par. **713**.

[3] Depth at quays, 16½–26 feet.

[4] Properly Maranhão.

Rio de Janeiro	1,150,000	Pernambuco	215,000
Bahia	350,000	Georgetown (cap. Brit. Guiana)	55,000

but cacao, cotton, tobacco, and sugar, besides other tropical products, are grown. Gold in the east and copper in the west are important minerals. The plains (llanos) of the Orinoco are devoted to cattle and horse rearing, an industry at one time much more flourishing than now. The chief inland towns are Carácas (the capital) and Valencia, which are situated in inland valleys from 1,800 to 3,000 feet in height, and are connected by rail with their respective seaports, La Guaira and Porto (Puerto) Cabello. Ciudad Bolivar, on the Orinoco, the navigation of which is free to all nations, may also be ranked as a seaport, being accessible to sea-going vessels. A beginning has been made with the working of an oil-field in the west near Lake Maracaibo.

1352. COLOMBIA, a republic with a similar population to that of Venezuela, settled chiefly in the upper parts of the valleys of the Cauca and Magdalena, where, in consequence of the high elevation, the grains of temperate climates are grown. In the lowlands, on the other hand, rice is grown ; and it is so generally eaten by the people that a deficiency of this commodity has to be made up for by import. The mineral wealth is great, and gold, silver, and precious stones are among the exports, which include also sugar, cacao of excellent quality, coffee, bananas, and rubber. The sugar is grown at various points of the coast, cacao in the lowlands, and coffee on the mountain slopes of the Cauca valley. The great channel of communication is the Magdalena, which is navigable for steamers without interruption as high as Honda, but on account of a bar at its mouth is connected with the sea by a railway from Barranquilla to the port of Sabanilla (the chief seaport), and higher up both by canal and rail with Cartagena. Bogotá, the capital, is within five degrees of the equator, but, in virtue of its situation at the height of 8,000 feet above sea-level, enjoys a healthy climate, with a temperature like that of a perpetual spring.[1]

1353. ECUADOR, a republic chiefly south of the equator, but which owes its name to the fact that its capital, Quito, is almost under that line. Quito lies, like Bogotá, between two chains of the Andes, its elevation being between 9,000 and 10,000 feet. The chief seaport is Guayaquil, whence cacao, grown on the western lowlands, is exported. Next in importance among vegetable products are ivory-nuts and coffee. The oil deposits are believed to be of great value. The former difficulty of communication between Guayaquil and the capital referred to in par. **11** was removed by the opening of a metre gauge railway, 287 miles long, in June 1908. The chief drawback at Guayaquil now is the difficulty of sanitation, which is greatly impeded by the strong tides of the Guayas carrying back the sewage. To Ecuador belong the Galápagos, or Turtle Islands, a group situated on the equator, about 700 miles to the west.

[1] See also par. **1333**.

Carácas	90,000	Bogotá	150,000
Valencia	55,000	Quito	70,000
Barranquilla	65,000	Guayaquil	95,000

1354. PERU, a republic lying to the south of Ecuador, with a population consisting largely of pure Indians. It is composed of three zones—(1) a rainless (**1344**) coast strip, fertilised only here and there by rivers from the Andes, which afford the means of irrigation for sugar and cotton plantations tended by Chinese coolies. (2) The sierra, or valleys and tablelands of the Andes. On one of the tablelands lies (partly in Bolivia) Lake Titicaca, the largest lake in South America, at the height of 12,600 feet above the sea. At this height even barley seldom ripens, and the only regular food-grain is derived from a native plant called quinoa (wholly unlike our cereals). (3) The Montaña, the region on the eastern slopes of the Andes, containing the head-waters of the Amazon, a district largely covered with impenetrable forests, of which the most valuable product is rubber (**447**). The capital of the country is Lima, an unhealthy city on the coast strip, a few miles from its port, Callao.

1355. The chief exports are sugar, silver, copper, and other metals or ores, cotton, and llama, vicuña, and sheep's wool; the sugar and cotton derived from the coast strip, the wool from the sierra. The mineral wealth for which Peru (including Bolivia or Upper Peru) was noted in Spanish times was long neglected, but in recent years renewed importance has been conferred on it by the laying of railways. Among those already in existence in Peru are two of the most remarkable in the world, those namely by which the tablelands of the Andes are reached (**1344**). One of these is the Lima-Oroya railway, which attains in its passage through the western chain of the Andes a height of 15,600 feet. This railway has been continued northward to Cerro de Pasco (14,100 feet), and since then productive silver-mines at that place, long abandoned in consequence of flooding, have been reopened, and an even more important copper-bearing district has been developed. The copper mines are expected to benefit greatly by the construction of a branch line leading to a coalfield which has been discovered 60 miles from this railway. The other Andes railway is from the southern seaport of Mollendo to Puno on Lake Titicaca on the one hand, and Cuzco, the ancient capital of Peru, on the other.[1] The value of the Mollendo-Puno line has already been greatly increased by the establishment of steamboat-traffic on Lake Titicaca and the river Desaguadero, the outlet connecting that lake with Lake Aullagas in Bolivia. Chimbote, in 9° S., connected by rail with a rich sugar district, has been made into a major port, that is one with a separate customs station. It is proposed to bring the Montaña, now almost completely shut off from external commerce, into connection with the outside world by the laying of roads in the north to the Amazon. In this

[1] This line it is now (1921) proposed to continue by Ayacucho to Huancayo, to which point a line runs southwards from Oroya, the seat of the electric works of the Cerro de Pasco mines. A branch from a point between Ayacucho and Huancayo would establish railway communication with the rich quicksilver deposits of Huancavelica.

Lima	175,000

district cotton and coffee plantations have already been started with success.

1356. BOLIVIA, a republic now entirely inland, occupying the broadest part of the tableland of the Andes, with a montaña to the east. Even the civilised population is mainly of Indian origin. The capital of the country is La Paz, on the tableland of Lake Titicaca. The Arica-La Paz railway, the shortest sea-connection (280 miles, as against 534 from Mollendo), rises to nearly 14,000 feet in height, and has hence very stiff gradients—as high as 3 per cent. on adhesive portions and within a hundred miles of the coast as much as 6 per cent. on a nearly continuous stretch of 25 miles, where a rack-rail is used. Sucre is the chief town on the part of the country drained to the east. The silver-mines of Potosi, discovered in 1545, which made Peru so valuable a possession to the Spaniards, and in the sixteenth century had an extraordinary effect in raising silver prices in Europe, belong to this state, and are still productive, though in a greatly diminished degree. The mines of Huanchaca, terminus of a branch of the railway from the Chilean port of Antofagasta to Oruro, are now much more productive, and the tin-mines at high altitudes (up to 18,000 feet) east of Lake Titicaca now yield the most valuable Bolivian export. Copper, bismuth, and other metals are also worked, and the eastern forests yield much rubber.

1357. CHILE, a republic in which whites predominate, possessing the whole of the coast-strip south of Peru, together with the islands that fringe the coast, including part of Tierra del Fuego, and both sides of the Straits of Magellan except in the extreme east. The northern portion of the country is a continuation of the desert strip on the coast of Peru, and is valuable solely for its mineral products—guano (near the coast from the frontier to about $21\frac{1}{2}°$ S.), nitrate of soda, or cubic nitre, as it is also called (in the same latitudes, but further inland), gold, silver, and copper. Copper is even more abundant further south, along the base of the Andes, north and south of Coquimbo. Silver is also found more abundantly to the south of Copiapo. The middle portion, between about 33° and 38° S., contains the bulk of the population (**66**). The agricultural products are mainly wheat, barley, and southern fruits—similar, in fact, to those of Spain and California, which have a climate resembling that of the more populous parts of Chile. The temperature, however, is somewhat lower, so that oranges are not grown as a commercial product. The district round Valdivia, about 40° S., is given more to cattle-rearing than agriculture. In some parts of the north there are admirable irrigation works.

1358. The capital is Santiago, and its port is Valparaiso, on a fine bay looking to the north. Here is received the great bulk of the imports, but since the greater part of the exports consists of mineral produce,

La Paz . . .	110,000	Valparaiso . .	220,000
Santiago . . .	425,000		

chiefly nitrate of soda, copper, and guano, the northern port of Iquique, whence most of the nitrate and guano is shipped, has the largest share in the export trade. A new port has been developed at San Antonio, 43 miles to the south of Valparaiso and only 70 miles from Santiago, with which it is connected by a railway having a maximum gradient of 1·5 per cent. as against 2·8 per cent. on the Valparaiso line. The fact that Germany and the United States form by far the largest markets for nitrate of soda accounts for the high place taken by those countries in the commerce of Chile as shown in the tables in the Appendix. Copper ore is mined chiefly in two districts, one immediately to the south of Santiago and Valparaiso, the other on a branch of the Antofagasta-Bolivia railway, 155 miles from the port mentioned. Iron ore is known to exist in various places, and vast deposits containing more than 50 per cent. of iron have been discovered in the province of Coquimbo. There is a considerable import trade in cattle and other animals from the Argentine Republic across the passes of the Andes, but the export trade by these routes is very scanty. Large numbers of sheep are reared both for wool and mutton round the port of Punta Arenas on the Straits of Magellan.

1359. The Straits of Magellan are stormy and washed by strong tides, and hence difficult of navigation, so that sailing-vessels still prefer the equally stormy, but for them less dangerous, route round Cape Horn, in the south of Tierra del Fuego. See also par. **172.**

1360. THE ARGENTINE REPUBLIC comprises a territory of more than a million square miles. This territory consists mainly of a vast plain sloping down to the Atlantic from the Andes, and other lofty mountains in the west and north-west. It extends from within the tropics to the south of the continent, embracing the eastern half of Tierra del Fuego, and thus includes a great variety of climate. The districts in which the population is most considerable and most rapidly increasing[1] are chiefly those in the neighbourhood of the estuary of La Plata and along the right bank of the lower Paraná, where there are not only the greatest facilities for commerce, but where also the climate is most favourable to production and best suited to people of European stock. The provinces to which this description applies are Buenos Aires, south of the estuary ; Santa Fe, on the right bank of the lower Paraná ; Cordoba, to the west of Santa Fe ; and Entre Rios, ' between the rivers ' Paraná and Uruguay. The climate here is that of the warmer temperate latitudes, generally with an ample rainfall, at least in the eastern districts. These provinces contain nearly all the wheat lands of the republic (**242, 245**). Towards the interior the rainfall generally diminishes, and irrigation becomes necessary for cultivation. It is more abundant, however, in the neighbourhood of the northern mountains, at the base of which there are sugar and other tropical

[1] Compare par. **1348** *n.* 2.

Cordoba (town)	. .	150,000

or sub-tropical plantations. The plain extending eastwards from these mountains to the river Paraguay is mainly a region of open forest, and is inhabited at present almost solely by a few tribes of wandering Indians. It is known as El Gran Chaco, or 'the great hunting-ground,' but is now looked upon as a hopeful future seat of cotton-growing.

1361. Of late years the Argentine Republic, together with the neighbouring state of Uruguay, has been undergoing a rapid development similar to that of the United States and Canada. They are receiving streams of **agricultural settlers,**[1] but mainly from southern Europe. Italians greatly preponderate, immigrants from Spain being next in numbers. The export table in the Appendix (p. 756) shows how greatly tillage has gained on the rearing of live-stock. In former days the land, especially in the province of Buenos Aires, was divided up into large estates given over to the rearing of cattle and horses, but these estates are now being broken up, and in 1918 a law was passed, designed to prevent their being again formed. Under this law each homestead is limited to from 50 to 450 acres, and is to be inalienable during the lifetime of the grantee and until his children become of age. The vine and sugar-cane are both cultivated, though they yield no export products—the vine on irrigated fields at Mendoza near the base of the Andes, and sugar at Tucuman, in about 27° S. As an illustration of the degree in which the structure of the country exposes it to cold winds from the south, it may be mentioned that these cane-fields have been known to be damaged by frost which more frequently injures the grain crops. As to wool see pars. **316, 319,** and as to quebracho see **576.** The **mineral wealth** includes coal of high quality at the base of the Andes in about 42° S., and oil, of which the principal wells lie near Rivadavia on the coast about 46° S.

1362. To what is said about the Paraguay and lower Paraná in par. **1345,** it may here be added sea-going vessels can ascend the Paraná to Rosario, that the Paraná is likewise navigable for steamers above the confluence of the Paraguay as far as the limit of the Argentine frontier, that steamers can ascend the Uruguay River on the eastern frontier as far as the falls, which occur in about 31½° S. (at the Uruguayan town of Salto), and that sea-going vessels of fourteen or fifteen feet draught can reach as far as the Uruguayan town of Paysandu. Great falls occur on the Iguazu on the northern frontier of the Misiones territory.[2] The Pilcomayo, on the northern frontier, is navigable for 240 miles,

[1] In the thirty years ending 1886 upwards of a million immigrants entered the country, and in each of the three years 1886 to 1888 the number considerably exceeded 100,000. In 1889 it exceeded 200,000, but in 1890 a check was put upon this immigration by the occurrence of a great financial crisis. Since 1889 down to 1903 inclusive, the only year in which the number of oversea immigrants exceeded 100,000 was 1896, but in 1907 the number reached 209,000.

[2] Works are now being carried out at this point for the development of the power electrically.

and the Rio Negro in the north of Patagonia affords 300 miles of navigation through a region deemed a few years ago scarcely fit for settlement, but which is now being rapidly stocked and settled along the whole course of the river. Patagonia, the territory south of the Rio Negro, is mainly a stony desert, but recent explorations have shown that it embraces a considerable amount of fertile land along the base of the Andes. On the coast of this territory there has long been a Welsh colony at Chubut in lat. 43°, where sheep are reared and some wheat is grown.

1363. As in the United States, **railways** are being rapidly extended to promote the commerce on which the immigration depends. A mere glance at the railway map following p. 664 is enough to show that the Argentine Republic is the part of South America in which railway construction has been, and still is, most active. Unfortunately these railways are on different gauges. Nearly all those which radiate from Buenos Aires are on the gauge of 5 feet 6 inches, but some of those which radiate from Rosario, and nearly all starting from Santa Fe, are on the metre gauge. Those in the provinces between the Paraná and Uruguay are on the gauge of 4 feet 8½ inches, which allows of direct communication with the railways of Uruguay, while the difference from other Argentine railways is of little consequence so long as the Paraná is not bridged or likely to be bridged. The railway connection of Buenos Aires with Asuncion by way of Encarnacion and a train-ferry across the Paraná at this point dates from October 1913. It involves in Paraguay the addition of a third rail to adapt the trains to the Paraguayan gauge of 4 feet 8½ inches. See also par. **1344.**

1364. The capital of the republic is Buenos Aires, which stands on the River Plate, and is at the same time the chief seaport. So shallow is the river at this place that all large vessels formerly had to anchor ten miles out, but large harbour works have been carried out, resulting in providing the port with docks having an entrance of 21 to 26 feet deep, according to the state of the tide. These works have deprived Ensenada, the port of La Plata, lower down the estuary, of a good deal of its trade, in spite of its artificial harbour available for vessels drawing 25 feet; but the growing importance of that part of the province of Buenos Aires which forms the hinderland of Bahia Blanca, where there is a minimum depth of 26 feet alongside of the pier, seems to assure for that port a steady and rapid growth. For the wheat, maize, and linseed trade of Argentina it is extremely important that Rosario, the great collecting centre for the northern part of the region producing these commodities, is accessible to ships of large draught. Vessels drawing 16 feet have long been able to reach it, and works are now in progress with the view of making the port available for vessels of 21 feet. The more northerly collecting centre of Santa

Buenos Aires	1,600,000	Rosario	220,000
La Plata	90,000	Santa Fe	60,000

Fe has deep water close at hand at its port of Colastine, but a bar between it and Rosario hinders the access of sea-going vessels.

1365. URUGUAY, a republic lying between the estuary of the La Plata and Brazil, has a similar surface, climate, and population, and similar industries to the neighbouring provinces of the Argentine Republic, and is now being as rapidly developed. Among the railways there is one avoiding the rapids of the Uruguay River above Salto (**1362**), which is now connected by rail with Paysandu and Montevideo. All the railways are on the 4 feet 8½ inch gauge, but that which runs north from Montevideo to the Brazilian frontier has a third rail to enable it to connect with a Brazilian system on the metre gauge. Having a greater rainfall on the whole than the more populous districts of the Argentine Republic, Uruguay rears relatively to area more cattle than the latter country. The business of meat-packing has made the small towns of Fray Bentos and Paysandu, on the Uruguay, well known throughout Europe. As to the foreign commerce see the tables in the Appendix (pp. 754–5.) The capital of Uruguay is Montevideo, which has a harbour much better by nature than that of Buenos Aires, though it is gradually becoming shallower through the accumulations of silt, carried down by the streams tributary to the River Plate. Large vessels (above 20 feet draught) have to anchor two or three miles from the shore and load and unload by means of lighters.

1366. PARAGUAY, an inland republic lying mainly between the Paraguay and Paraná Rivers, with a very sparse population, chiefly of native Indians. Capital, Asuncion. Its chief export products are the so-called Paraguay tea, or maté, and oranges, orange trees growing wild or cultivated almost everywhere in the republic. Tobacco, timber, and skins are also exported. The railway now connecting Asuncion with Buenos Aires (**1363**) runs through the maté-producing region.

1367. The **FALKLAND ISLANDS,** situated to the east of the Straits of Magellan, belong to the British. They have a damp, foggy climate, and are largely covered with peat, but are inhabited by a small number of settlers engaged in the rearing of sheep and cattle. They are frequently visited for repairs and supplies by vessels that have made the passage round Cape Horn. A considerable export trade in frozen mutton has sprung up.

Montevideo . .	350,000	Asuncion . .	100,000

AUSTRALASIA AND POLYNESIA

AUSTRALIA

1368. The vast island or continent of Australia has an area of nearly three millions of square miles, and is accordingly almost exactly equal in extent to the United States of North America, exclusive of the territory of Alaska. A good deal more than one-third of it lies within the torrid zone, but the great bulk of its population belongs to the region outside of that belt. Most of the inhabitants, moreover, are found within two or three hundred miles of the coast, and from the nature of the climate this can never be otherwise.

1369. The coast-line of this vast island is remarkable for its long stretches of uniform character, without inlets that can be made use of by shipping even for shelter. The principal exceptions to this character are on the eastern side and in some parts of the north-west.

1370. To the north of Hervey Bay, on the east coast, numerous coral-reefs rise to the surface of the water, making the seas somewhat dangerous to shipping, and about one degree north of the Tropic of Capricorn there begins a series of coral-reefs such as are to be seen nowhere else in the world over the same extent of sea. These form together what is known as the **Great Barrier Reef,** which extends for a distance of about 1,200 miles, advancing into the latitudes of Torres Strait, which it nearly closes. Its widest part is in the south, where it extends for about 100 miles from east to west, and in that part also it lies furthest from the coast. As it narrows towards the north it comes nearer to the coast, being in many places within ten miles of the land, opposite the promontories, and generally not more than fifteen or twenty miles distant. At low tide the surface of the reef is just about the level of the surface of the water, and at all states of the tide the border of the reef can be distinguished by the strong breakers that wash over it. The reef however is not continuous. It is broken up by many deep channels, some of which are narrow, others from ten to twelve miles wide. To seamen these channels are of great importance, since they allow of a choice of routes between the seaports in the east of Australia and Torres Strait. The route within the Barrier Reef along the Australian coast has the advantage of a calm and beautiful sea owing to the protection which the reef affords, and is that preferred by steamers, whose course can be more easily controlled than that of

sailing-vessels. But this route is one that requires careful navigation, and above all at night, when the reef cannot be made out at a greater distance than half a mile. By day it is visible at a distance of four miles from the bridge and seven miles from the rigging. Hence, sailing-vessels that take the inner route proceed on their course only by day, anchoring for safety at night. For the most part such vessels go outside of the reef altogether into the open ocean, and pass through one of its northern channels into or out of Torres Strait.

1371. Even to the west of the Barrier Reef the navigation of **Torres Strait** has been made difficult by the coral builders. The hundred miles of sea between Cape York and the south coast of New Guinea, besides being studded with numerous small islands, are crowded with coral reefs and sandbanks, which leave only one or two safe channels for shipping between them. The channel most used is that which lies immediately north of the Prince of Wales Group of islands, on one of which, named Thursday Island, there is a much-frequented calling station for shipping.

1372. Off the southern part of the east coast of Australia, there is at all seasons a strong current setting southwards. It forms a broad belt at the distance of from twenty to sixty miles from the land, on which account vessels going northwards (from Bass Strait to Sydney) keep more than sixty miles from shore to avoid the current, and those going southwards keep within the current to take advantage of it.

1373. The **surface** of Australia is for the most part fairly level, consisting either of plains or plateaux of great extent. In the east, however, a continuous range of highlands runs at no great distance from the coast from north to south, and then bends with the coast westwards, terminating in the south-east of the colony of South Australia. The general name of Dividing Range is given to the whole of this series, since it separates the low-lying coast valleys and small plains from the broad plains of the interior. In the south-east, where the Dividing Range attains its highest elevation (with peaks above 7,000 feet in height), it forms a regular mountain chain known by the name of the Australian Alps.

1374. The Dividing Range has been the chief obstacle in the establishment of **railway communication** with the interior—an obstacle which has been overcome in some places, especially in New South Wales (**1394**), only by great engineering skill. The map opposite shows that there is no railway connection of the coast with the interior between Melbourne and Sydney, and a careful study of physical maps shows that this is a natural consequence of the superficial configuration, which is thus disadvantageous for both the states to which these ports belong, but at the same time favourable to the ports themselves, as concentrating upon each a greater amount of traffic than would otherwise have fallen to them. Both railway maps also show the lack of uniformity in gauge, a defect which is every year becoming more serious as the

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interstate traffic increases[1] and is now (1921) engaging the earnest attention of the federal government.

1375. The plateau in the east of Australia attains at its widest a breadth of rather more than one hundred miles, and gradually sinks on the west to low level plains, which occupy the greater part of the middle of Australia. The western half of the island, so far as it has been explored, consists mainly of a low plateau about 1,000 feet in height or less.

1376. The series of highlands above described is appropriately called the Dividing Range, not only on account of the contrast presented by the surface on different sides of it, but also because of the influence which it has upon the **climate.** The chief rain-bearing winds of Australia blow more or less from the east, since the island lies mostly in latitudes in which the south-east trade-wind prevails, and the causes which give rise to that wind have a great effect on the direction of the air-currents even on the land. Hence, in the western half of the island the prevailing tendency of the winds is seawards. The period of the year in which this tendency is mostly overpowered is the summer, when the excessive heat of the interior brings about great rarefaction of the air, but at the same time tends to prevent much of the vapour brought from the sea from being condensed into rain. As to the climate of the extreme south-west see par. **66.** The highlands on the east, however, have their usual effect on sea-borne vapours, and their eastern slopes are copiously watered at all seasons of the year, but in the tropical and sub-tropical latitudes chiefly in summer (**64**). The interior plains and plateaux, on the other hand, receive less and less rain the further they are distant from the sea, and almost all parts which are more than two hundred miles from the coast receive much less rain in the course of the year than the driest parts of England. This rain, too, falls in latitudes in which the heat and consequent evaporation are greater than in the British Isles, so that in summer the ground is everywhere parched and cracked, and the grass withered, and none but winter crops can be grown, even where the rainfall is sufficient to grow crops at all. And even if the average rainfall is adequate for the crops usually grown and for the wants of the live-stock reared it is in many parts very precarious, years of flood alternating with years of drought, leading to great variations in the yield of the crops (**242**) and the number of sheep and cattle that can be reared in a given area.

Between the northern part of Australia which lies within the tropics, and the southern part, from 10 to 15 degrees beyond the tropics, there are of course great differences in the temperature; but in all parts of Australia there is in the low grounds no winter of snow and frost to

[1] The *Official Year Book* of the Commonwealth mentions that 'the junction charges on interstate traffic between New South Wales and Victoria range from 1*s.* 6*d.* to 2*s.* 6*d.* per ton.'

interrupt the labours of the field, or to make it necessary to provide shelter for horses and cattle. See also par. **1384.**

1377. The nature of the climate of Australia explains that of the Australian **rivers.** Most of those which enter the sea on the east and south-east of the Dividing Range are comparatively short, but are generally well supplied with water all the year round. They vary greatly in their depth according as the weather is dry or rainy, and they are in many cases apt to overflow their banks. Many of them are navigable for a shorter or longer distance up; but they bring down so much sediment from the neighbouring highlands in which they take their rise, or from which they derive their feeders, that bars are formed in many cases at their mouths, and the entrance of large vessels thus prevented or impeded.

1378. All the great rivers of Australia take their rise on the inner slopes of the tableland, and flow towards the west or south-west. Only one of these, the Murray, enters the sea by an independent mouth. Before entering the sea this river turns nearly due south and flows through a large shallow sheet of water called Lake Alexandrina, which communicates on the south with Lake Albert, and a long shallow lagoon known as the Coorong, separated from the sea by a broad line of sand-dunes. The longest tributaries of the Murray are those which it receives on its right bank, the Murrumbidgee and the Darling, the former of which receives on the right another great tributary, the Lachlan. These rivers might all be ranked among the great rivers of the world if we considered only their length (the Murray and the Darling being both much more than 1,000 miles long), but the climate of the region through which they flow causes them to be very scantily supplied with water. The Darling even dries up in summer in many parts of its course into a chain of small lakes.

1379. Nevertheless all these rivers are navigable by steamers of shallow draught for a long distance into the interior. In ordinary circumstances the Murray can be ascended as high as Albury, 1,700 miles from its mouth, the point where the river is crossed by the railway from Melbourne to Sydney. Except in dry seasons the Murrumbidgee can be navigated up to a point about a degree further east than Albury, and the Darling is navigable at times up to the confluence of the Bogan, 1,000 miles above the point where it joins the Murray. Unfortunately, however, this river navigation cannot be continued into the sea. The line of sand-dunes which separates the Coorong from the sea is continued in the form of a bar across the mouth of the Murray, where it leaves Lake Alexandrina, so that goods must be laid down or taken up at some point in the course of the river and carried the rest of the distance by land. In June 1915 a beginning was made with works, involving the construction of nine locks on the Murray, with a view to improving the navigation and increasing the facilities for irrigation.

1380. Of the other long rivers which are to be seen on maps traversing the plains in the interior of Australia, the greater number are hardly rivers at all in the proper sense of the term. They are merely watercourses which may be filled at times with running water, but which are often empty except for a few days in the year. Many of them after a longer or shorter course dry up and disappear, their water having all sunk down into the porous sand which forms their bed, or evaporated under the heat of the sun. The most important of the streams that end in this way is the Diamantina, which enters South Australia from the south-west of Queensland. Others empty themselves into large shallow salt lakes, which in summer shrink greatly in dimensions. There are several such salt lakes in the lower parts of Australia, the chief being Lake Torrens and Lake Eyre, into the latter of which flows at certain seasons the Barcoo River, or Cooper's Creek, the longest of these feeders of island lakes. In the dry period of the year this river in its lowest part creeps on more and more slowly, and in the end dries up like the Diamantina, though the course which it follows in times of flood, when it swells to a breadth of two miles and rises to a depth of twenty feet, can still be distinguished by the grass and trees by which it is bordered.

1381. The use of the great rivers of the Australian plains as navigable highways and for the watering of flocks is the most important to which they have yet been put, but a much more valuable use is likely to be found for them in the future. The gradual slope of the plains over which these rivers flow seems likely to admit of many large tracts being irrigated by their means.

1382. Vegetation.—On the tableland and plains of the interior an Australian forest is open and easily traversed either by a horseman or by carriages, and leaves plenty of space for grass and herbage on which sheep may be pastured. Such is the general character of the Australian bush. The forests become thinner and thinner the scantier the rainfall. In many of the more arid parts large stretches of ground are occupied by dense masses of low bushes difficult to penetrate and difficult to destroy, these patches being well known as 'scrub'; and in more arid regions still the bushes forming the scrub are often armed with strong sharp spines, which tear the clothes and the flesh of those who try to force their way through. The hated spinifex is a shrub of this kind, which covers by itself vast areas in the deserts of the west.

The native grasses of Australia are numerous and nutritious, and among these the tall kangaroo grass is notable for its power of withstanding long drought. And even where the climate is so dry that grasses do not thrive, there are certain herbs which will still thrive and yield good food for sheep and cattle. The most valuable of all these is the salt-bush, an ugly grey shrub about two feet high, which, as its name indicates, flourishes on a saline soil, such as is apt to be found where rain is scarce and evaporation great (**87**), but which is all the

better for sheep on that account, since the sheep that are fed on a saline herbage are reported to furnish the finest wool, and are free from certain diseases to which they are liable in other districts.

1383. People.—The native Australians belong to a very low type of humanity, are few in numbers, and appear to be fast dying out. They were never numerous, and their total number is estimated at less than 80,000.[1] The first inhabitants sent from the British Isles to Australia were convicts, and the first ship containing convicts sailed in 1787, and arrived at Botany Bay, in New South Wales, early in 1788. Soon free settlers began to arrive. These were mainly from the British Isles, but there is also a large proportion of Germans. Chinese (these nearly all men) and Polynesians have been introduced into Queensland as labourers on the tropical plantations (**1396**); but under the legislation of the Commonwealth not only is the introduction of all coloured labour prohibited,[2] but even that of white labourers under contract, unless it can be shown that the labour which these supply is of a kind that cannot be obtained in the Commonwealth.

1384. An interesting comparison may be made between Australia and South Africa so far as they correspond in latitude, both in respect of resemblances and differences. The northernmost latitude of Australia corresponds to that of the mouth of the Rovuma in South Africa, but Australia (excluding Tasmania) extends, in the south-east, four degrees beyond South Africa. These areas both lie between two oceans, and are so far similar in structure that they both have ranges of mountains running parallel to the east coast and then turning west to face the south coast and have a large extent of high plains in the interior; but they differ in that the eastern mountains are much higher in Africa than Australia, in that the southern mountains are found only in the east of Australia, but extend along nearly the whole width of South Africa with terraces intervening between the mountains proper and the sea, in that the higher plains of Africa are towards the east, those of Australia (mostly much lower) towards the west, and that in Australia a broad belt of low plains intervenes between the higher elevations of the west and east. There is the further notable difference that Australia is an island, South Africa only part of a much larger continent. This latter difference probably contributes, along with the higher altitude of the African mountains, to explain the somewhat striking contrasts in the seasonal distribution of the rainfall between places in corresponding latitudes on the eastern side, which in both is that which has on the whole the most abundant rainfall. This is illustrated by the following table in which the column S. gives

[1] About 20,000 are enumerated chiefly in Queensland and Western Australia as working for white men.

[2] Under the Pacific Island Labourers' Act no Pacific Islanders are allowed to enter Australia after March 31, 1904, or are to be allowed to remain there after the end of 1906.

the rainfall in inches for the three months of high summer December-February, W. that for June to August.

South Africa

	Alt. Ft.	Lat.	Rainfall. S.	W.	Yr.
Kimberley . . .	4,000	28¾°	6·5	0·8	19
Bloemfontein . .	4,500	29°	11·5	2·0	25
Aliwal North . .	4,300	30½°	11·3	2·5	26
Graaff Reinet . .	2,500	32¼°	6·0	1·5	17
Cape Town . . .	—	34°	3·0	18·0	26

Australia

	Alt. Ft.	Lat.	Rainfall. S	W.	Yr.
Toowoomba . . .	2,000	28°	13·5	8·0	40
Tenterfield . . .	2,800	29°	9·5	7·0	31
Armidale . . .	3,300	30½°	11·0	7·0	36
Bathurst	2,200	33½°	7·3	5·5	25
Perth	—	32°	1·5	18·0	36

The first four in each of these series illustrate the contrast just referred to. A glance at the corresponding columns is enough to reveal the fact that the proportion of winter rains in South Africa is very small compared with that at the represented Australian stations; in South Africa the winter rainfall is only from 12½ to 25 per cent. of the summer, as against 33 to 74 per cent. in Australia. The higher winter rainfall in Australia is no doubt largely due to the fact that situation and structure leave the east side of that continent open to vapour-bearing winds both from the north and south; and this again will go far to account for the fact that the pasturage of Australia is more succulent and freer from injurious thorny and prickly vegetation than that of South Africa, and that the Australian continent on the east side has much larger areas suited for wheat than the same side of Africa. From this point of view a comparison between the last two places in the table, those illustrating the areas of Mediterranean climate (**66**) in both continents, is also instructive. It will be noted that Perth is 2° further north than Cape Town, a latitude at which on the west side of South Africa the rainfall of the year is quite negligible, which explains why in this part also Australia has a much greater area suited to wheat than South Africa. In temperature, it should be noted, there is little difference between the corresponding stations in spite of differences in altitude, as is shown by the following table in which A. gives the mean temperature of the hottest, B. of the coldest month.

	Alt. Ft.	A.	B.		Alt. Ft.	A.	B
Kimberley .	4,000	76° F.	50° F.	Toowoomba	2,000	72° F.	48° F.
Bloemfontein .	4,500	73°	47°	Tenterfield .	2,800	70°	47°
Aliwal North .	4,300	70°	46°	Armidale .	3,300	70°	44°
Graaff Reinet .	2,500	74°	52°	Bathurst .	2,200	73°	43°
Cape Town .	—	70°	55°	Perth . .	—	76°	55°

Another very important difference resulting from Australia being an island is that there is no such native question there as forms such a serious problem in South Africa, that in Australia the white man can and does work with his hands without the sense of lost dignity.

1385. The Australian States and New Zealand.—Area, Population, and Products :—

States and Territories of the Commonwealth. Dominion of New Zealand.	Area in thousands of square miles.	Ratio to Great Britain.	Population in thousands.			Number per head of population, 1918.		
			1871.	1901.	1921.	Sheep.	Cattle.	Acres under crop.[1]
Victoria . . .	88	1	732	1,208	1,532	11·02	1·12	2·76
New South Wales .	309	3½	504	1,360	2,100	18·97	1·67	2·02
Queensland . .	671	7½	120	503	758	26·24	8·33	0·76
South Australia .	380	4⅓	186[2]	366[2]	495	14·53	0·75	6·98
Western Australia .	976	11	25	195	332	22·92	3·01	5·12
Northern Territory .	524	6	—	—	4	12·26	119·23	0·02
Federal Capital Territory . . .	1	—	—	—	3	58·59	3·77	0·80
Tasmania . .	26	⅖	102	173	214	8·82	1·04	1·22
Commonwealth .	2,975	33	1,669	3,805	5,437	17·16	2·51	2·65[3]
New Zealand . .	105	1⅐	256	816	1,320	19·57	2·30	15·21[4]

1386. The **AUSTRALIAN COMMONWEALTH** was constituted under an act of the Imperial Parliament passed in 1900, and was proclaimed at Sydney on January 1, 1901. The colonies above mentioned, except the colony of New Zealand, now form the six original states of this Commonwealth, which among other powers has the right to pass laws regulating trade and commerce with other countries and among the states, but subject to the provisos that uniform customs-duties shall be imposed, and that trade shall be free within the Commonwealth ; laws regulating taxation, but so as not to discriminate between states, or parts of states ; laws as to naval and military defence, including the control of railways for such purposes, railway construction and extension, &c.

The site of the permanent capital, to which the name of Canberra was given on March 12, 1913, on the occasion of the initiation of the

[1] In 1918–19. [2] Before the severance from it of the Northern Territory.
[3] Maximum, 3·76, in 1915–16. [4] Including sown grasses.

operations for laying out the city, is an area at the height of from about 1,800 to upwards of 2,000 feet above the sea, lying in a piece of territory in the south-east of New South Wales, by which the territory was ceded to the Commonwealth on January 1, 1911. It has already been connected by rail with the New South Wales railway system, and a railway is also to be laid connecting it with Jervis Bay, where other land has been ceded to the Commonwealth for the formation of a commercial port and naval station. Melbourne is to be the seat of the general government till the offices at Canberra are ready for occupation.

1387. Animal products.—The native land mammals, nearly all of which belong to the same peculiar group as the kangaroo (marsupials), yield furs of comparatively small value in the aggregate, and from a commercial point of view destroy a great deal more than they produce. The same is true of the dingo, or native dog, the only large native mammal that is not a marsupial. The most valuable of the introduced animals is the sheep, wool holding at the lowest the second place in value among the objects of production in all the colonies. The wool production of the Australian colonies in general is treated of elsewhere (**316-20**), but here it may be added that no part of the world has shown itself better suited for the production of fine (merino) wool (**314**) than the treeless grassy plains with a saline soil bordering the Murray River and its tributaries in Victoria and New South Wales. As to frozen mutton and beef see par. **488,** and as to rabbits see **126** and **487.**

1388. Cultivated crops.—In the states of the mainland in which, as shown in the last column of the table in par. **1385,** there was the greatest extent of land under cultivation relatively to population, wheat is the chief crop. Till the end of last century South Australia was the chief wheat-growing part of Australia, but the movement for closer settlement has brought about a great increase in wheat cultivation in all the states extending into lower latitudes, and even before the war New South Wales had come to have the greatest area under this crop though not the highest production.[1] The vine receives most attention (**298**) in Victoria and South Australia. Sugar-cane is cultivated in Queensland, and a variety has been found to succeed far beyond the tropics, and is grown even in the north-eastern valleys of New South Wales. With regard to the olive see **456,** and as to southern fruits see **1392.**

1389. The **mineral wealth** of the states already commercially available is enormous. Hitherto by far the most important of the mineral treasures has been gold. It has been found more or less in all of them, but most abundantly in the three eastern states of Australia and in New Zealand. Victoria stands first in respect of the amount of gold produced, having raised gold since its first discovery in the colony, in 1851, to the value of upwards of £250,000,000,

[1] The area under wheat in the Commonwealth increased from 9·3 million acres in 1913–14 to 12·5 million in 1915–16, but afterwards greatly declined.

or about six times as much as any other state. But with regard to this metal it is important to bear in mind that, on account of its great value, it is so eagerly searched for in districts known to be rich in it, that the amount yielded by any district soon begins to diminish. Hence the prosperity which a gold-field brings to a district is often only a passing prosperity. While the aggregate value of Australian wool increased pretty steadily till after 1890, that of gold soon reached its highest value and began to decline. The period from 1856–60—that is, the first period of five years after that in the beginning of which the first great discovery of gold was made—was the period in which the value of gold produced in all the Australian states reached its highest; and in every succeeding period of five years the total value has been less than in the one immediately before. (See **558, 559.**) The other minerals of commercial importance include copper in South Australia and New South Wales; tin in all the eastern colonies and Tasmania; silver, lead, and zinc in New South Wales (Broken Hill District); coal in New South Wales, Queensland, Victoria, Tasmania, and New Zealand; and oil-shale in New South Wales. Ores of iron are present in large quantity in almost all the states, and some of the more important deposits are now utilised under government encouragement in the development of iron and steel industries. Of these the most important is the Iron Knob, a hill of iron ore, containing a high percentage of iron, situated about 40 miles W.S.W. of Port Augusta (South Australia) and smelted and worked up into iron and steel products at Newcastle (New South Wales). Other important deposits giving promise of immediate development exist on the Blythe River in the north-west of Tasmania and on Yampi Sound in the north-west of Western Australia.

1390. Commerce.—On this matter the tables in the Appendix (p. 718) may be allowed very largely to speak for themselves. A preferential tariff in favour of the mother country has been in operation since August 8, 1907, and since that date the preference has been increased.[1] The marked advance in the trade of Australia with foreign countries as compared with a stationary or declining proportion of the trade carried on with the United Kingdom since the period 1881–85 is not to be wondered at, when it is considered that it is mainly since the beginning of that period that direct trade has been opened up with foreign countries. Direct trade with Germany began in 1879, with Belgium in 1881, with France in 1883. From 1887 till the eve of the Great War the North German Lloyds ran regular steamers to Australia; and from 1888 a line of German cargo-boats connected the chief Australian wool-ports with Antwerp, Hamburg, and Dunkirk. A regular service is maintained between San Francisco and the Commonwealth, and Japanese and Norwegian vessels take an important part in the trade,

[1] It is proposed to extend the preference to other members of the Empire.

the Norwegian mainly sailers chartered for cargoes of wheat, coal, ores, and other bulky products.

1391. All the states, and even the ports of the Kimberley district in the north of Western Australia, are now in regular steam communication with Europe. Different routes are followed, but most of the ships pass through the Suez canal and along the south coast of Australia. Since 1872 the Australian states have been connected by electric telegraph with the rest of the world, through the completion of the overland line which crosses the state of South Australia and the Northern Territory between Adelaide and Port Darwin, and is there connected with a line which passes under the sea to the Dutch island of Java. The cable from Vancouver to Queensland and New Zealand by Fanning, Fiji, and Norfolk islands was completed in November 1902.

1392. THE SEPARATE DIVISIONS (The States and the Northern Territory).—**A.—Victoria** is the smallest of the states on the mainland of Australia. It occupies the extreme south-east, and is separated from the state of New South Wales mainly by the Murray River. The first permanent settlement on its territory was made towards the close of 1834. Till 1851 it was a dependency of New South Wales. A large part of the surface is mountainous. The Australian Alps, with their spurs, fill the greater part of the eastern half of the state. West of these mountains the Dividing Range sinks in elevation, so that easy routes could be found for the railways laid north of Melbourne to the plains on the other side. The plains to the south of the Dividing Range, lying as they do on the moister side of the mountains (**1376**), are well watered, in many places thickly covered with trees, and clothed with rich grasses, more suited for horses and cattle than for sheep. This is especially the character of Gippsland, the region to the south of the Australian Alps. In the north there is greater dearth of rain ; nevertheless, it is in this part of the state that the area under crops has been most rapidly increasing of late years, since the decline of the gold-fields has caused so many people formerly engaged in mining to take to farming (**1389**). In some years the rainfall even here is sufficient to allow of abundant crops being grown, but when the rains fail great loss follows to the cultivators. Hence, if farming is to be carried on regularly with success in this region, it can only be by irrigation, to which great attention is given by the government. All the streams are vested in the state, which has constructed storage works for irrigation on all the more important of them. In the north-west is the district called Wimmera, at present mainly a waterless desert, but containing a tract with an excellent soil bordering the Murray, on which large irrigation works have been carried out at Mildura, and are now managed by a government trust. (See the map, p. 675.) The area embraced by these works is a quarter of a million acres. Among the objects of cultivation are grapes, including the raisin and currant

grapes; oranges, figs, apricots, and peaches; plums, including plums for prunes; besides sorghums (**422**), tobacco, fibre-plants, and other crops. Further south the plains are now being reclaimed for wheat cultivation by clearing them of what is known as the mallee scrub, that is, thickets of the *Eucalyptus dumosa*, brittle-stemmed trees growing to the height of from 12 to 20 feet; but the yield of the crops, like the rainfall, is scanty and very precarious. Sugar-beet is becoming an important object of cultivation round Maffra in Gippsland. Brown coal is being mined in rapidly increasing quantity on the east side of Western Port.[1]

1393. The capital and chief seaport is Melbourne,[2] situated on the Yarra, a short distance above its mouth in Port Phillip Bay. The Yarra is navigable up to the city by vessels of considerable size, including all those engaged solely in the intercolonial trade; but the harbour of Melbourne for the largest ocean steamers is formed by Hobson's Bay, the upper part of Port Phillip. On this bay stand Port Melbourne (formerly Sandridge) and Williamstown. Port Phillip itself is a shallow sheet of water, which affords a large extent of safe anchorage, but has a very narrow and difficult entrance. On a western arm of this bay stands the port of Geelong, a town that has long carried on the manufacture of coarse woollen tweeds, &c., which are exported to all the Australian states. In the interior, north-west of Melbourne, is Ballarat, the centre of the richest alluvial gold-field ever opened up, but which is now to a large extent exhausted, gold being now mainly obtained not by digging, but by the crushing of quartz-rock. In a more northerly direction from Melbourne lies Bendigo (Sandhurst), the chief centre of quartz-crushing; on the Murray, Wodonga, opposite the New South Wales town of Albury, at the head of the ordinary navigation, where the river is crossed by the railway to Sydney; lower down Echuca, at the place where the river makes a sharp bend to the north-west, and where another railway now crosses into New South Wales. (See map, p. 675.)

1394. B.—New South Wales, so called by Captain Cook, who was reminded of the Wales of Great Britain by the appearance of the mountains which he saw from off the coast. It was in this state that the first settlement was founded in Australia (**1383**), namely, on the magnificent natural harbour of Port Jackson, the harbour of Sydney, which has few rivals in the world for either beauty or convenience. Throughout this state the Dividing Range forms a more continuous barrier between the coast lowlands and the interior plains and table-lands than it does in Victoria, and it was long before the settlers found a way across the Blue Mountains, as the part of the Dividing Range behind Sydney is called. The route at last found in this quarter is

[1] An electricity commission has obtained authority to utilise this fuel at a large power station to be established at Morwell, 80 miles east of Melbourne.

[2] Melbourne, including suburbs within a radius of ten miles, about 750,000.

now traversed by a railway, which finally pierces the mountains in a tunnel 3,700 feet above sea-level. Formerly the line descended on the west side in numerous zig-zags, but these were avoided by the opening of an easier route in 1910, and three years later similar improvements were made on the east side, reducing considerably the cost of working the traffic. Further north the New England Range, trending north and south (crossed by rail, on Ben Lomond, at a height of 4,473 feet), and the Liverpool Range, trending east and west, shut off the part of the tableland known as the Liverpool Plains, which contain the head-waters of the Namoi, or Peel River, one of the tributaries of the Darling. It is in New South Wales that the steepest railway gradients in Australia occur. In that state $152\frac{1}{2}$ miles have a gradient at least as steep as 1 in 40, 350 miles in all up to 1 in 50 (**1171, 1253**). The interior of New South Wales generally is traversed by the chief tributaries of the Murray, and the treeless plains noted for their wool (**1387**) lying to the north of that river are hence known as the Riverina. The population of New South Wales of late years has increased at a much more rapid rate than has that of Victoria, which it now exceeds. It is, however, much more widely distributed over the surface, so that there is no part of New South Wales where the railways are so thickly crowded together as they are in part of Victoria. The reason of this is that the mineral treasures of the state are more widely distributed than in the sister state ; and the population engaged in agriculture is similarly scattered, partly because it is the interest of corn-growers to be near those who will buy their corn, and partly because the lands best suited for agriculture in New South Wales are dotted at wide intervals over the state. Most of the coast strip is rather sterile, except here and there in the valley-bottoms. On the tableland within the Dividing Range there is a greater extent of good soil, but the rainfall ceases to be sufficient for agriculture within a distance of 150 or 200 miles from the coast.

Lord Howe's Islands and Norfolk Island, lying to the north-east of Sydney (the latter nearer the north-west point of New Zealand), are dependencies of New South Wales. They both contain a small number of inhabitants.

1395. The capital of the state and chief seaport is Sydney, on Port Jackson. At the head of the so-called Parramatta River, which is in reality a prolongation of the inlet of Port Jackson, stands Parramatta, in a district noted for its oranges. North of Sydney, on the estuary of the Hunter River, stands Newcastle, the chief coal-mining town and place of export of coal. The coal is now exported not only to all the other Australasian states, but also to India, China, South America, and even San Francisco. Another important coal-port is Wollongong, to the south of Sydney, the port of the Illawarra coal-field. Bathurst, on the tableland behind Sydney, is the centre of the chief wheat-growing district of the state ; Deniliquin, that of the

Sydney . . .	830,000	Newcastle . . .	65,000

pastures of the Riverina (**1394**), and the starting-place of the railway by which the wool of that district is despatched for export to Melbourne; Broken Hill and Silverton, near the western frontier, the chief towns of the Barrier Range, a silver-yielding area said to be 10,000 square miles in extent; Cobar, in the heart of the state, the chief copper-mining, and Vegetable Creek, near the northern frontier, the chief tin-mining, town. The water-supply of the silver-mining district was at first a difficulty, but is now obtained from local rivers. Most of the ore is conveyed to Port Pirie in South Australia, and there smelted.

1396. C.—Queensland, the state to the north of New South Wales, once, like Victoria, a dependency of New South Wales, from which it was separated in 1859. It includes all the islands in the narrowest part of Torres Strait (**1371**). The surface consists mainly of tableland above 1,000 feet in height, and the district in the south-east known as the Darling Downs, on which are the finest pasture grasses in the state, is about 2,000 feet high, and thus has a comparatively cool climate for its situation, within five degrees of the Tropic of Capricorn. Extending far into the torrid zone, Queensland has more varied products than the more southern states. Among the tropical and subtropical products are cotton [1] (**355**), arrowroot, ginger, coffee, fruits, but at present chiefly sugar-cane, which is largely grown in the low river-valleys on the coast (see **1383**). Gold is found at many places, but most abundantly round Charters Towers, near the Burdekin River, about the middle latitude of the state, and round Gympie, in the Wide Bay district, not far from the coast in the south-east. Tin is found in two widely separate districts. One of these is on the tableland in the extreme south of the state, in a district adjoining the New South Wales tin-field, the centre of this district being Stanthorpe. The other, which is the more productive of the two, is round Herberton near the east coast, in about 17½° S. lat. A very rich copper district lies round Cloncurry, in the west of the state, to the south of the Gulf of Carpentaria, and in January 1908 this was connected by rail with Townsville. Besides metals, Queensland is very rich in coal, but it has not, like New South Wales, a coal-field accessible to ocean-going vessels. The chief collieries are in the basin of the Brisbane and Bremer rivers, and next in importance are those from 15 to 20 miles north of Maryborough in about 25° S.

1397. The capital of the state is Brisbane, 500 miles north of Sydney, situated on both sides of the Brisbane River, at the head of navigation for large sea-going vessels. Toowoomba, on the tableland to the west of Brisbane, is the chief town on the Darling Downs. Rockhampton, close to the Tropic of Capricorn, at the head

[1] In 1915 an agreement was come to by the British and Commonwealth Governments, the Dominions Royal Commission, and the British Cotton Association for the encouragement of cotton-growing in Queensland.

Brisbane . . .	200,000

of navigation of the Fitzroy River, is the second town in population in the colony and the outlet for a rich and extensive pastoral district as well as for districts producing gold and copper. Townsville is the outlet for several large gold-fields, including that of Charters Towers, and also for a large area of pastoral country, so that it has become an important seaport though it has only an open anchorage. Brisbane, Rockhampton, and Townsville are the starting-points of three lines of railway which are being laid for a distance of from 300 to 500 miles into the better parts of the tableland. The fine harbour of Bowen, naturally the best on the coast, still lacks for its development direct railway communication with the interior.

1398. D.—South Australia does not answer to its name, though the name is somewhat more appropriate since the separation of the Northern Territory **(1401)**. It was founded in 1834 by an act of the British Parliament, and was then expected ultimately to include the territory belonging to Victoria. Most of the inhabitants of the state are confined to a district smaller than England, which is the only part in temperate latitudes that receives even a fair supply of rain, chiefly in winter **(66)**. This district lies mainly to the east and north of Spencer Gulf and the Gulf of St. Vincent, where it is traversed by the Mount Lofty Range and the Flinders Range of mountains. Among agricultural products wheat is the most important. Wine and olives are also included. From an early date copper has been its chief mineral, but a gold-field, said to be rich, has been discovered about 200 miles north-east of Adelaide. **Irrigation** is practised in the drier parts of the state. At Renmark (see the map on p. 675) similar irrigation works to those of Mildura in Victoria have been carried out. Irrigation by artesian wells **(98)** is found to be practicable at several places in the neighbourhood of Lake Eyre,[1] which is the lowest-lying part of Australia. Further north the telegraph line passes through many well-grassed regions which may some day be settled, and other grassy tracts are now known to border some of the river courses of this region.

1399. The capital of the state is Adelaide, situated near the east side of the Gulf of St. Vincent. It was founded in 1837, and named after the queen-consort of William IV. About seven miles from the city stands Port Adelaide, on a small inlet opening out of the Gulf of St. Vincent. An outer harbour with a depth of 30 feet, opened at this port in January 1908, first provided accommodation for large ocean steamers. From the completion, in 1887, of the series of railways from Adelaide to Melbourne and Sydney, the port of Adelaide was 'the Brindisi of Australia'—the place at which all the mails are collected and landed by vessels following the south coast route; but was displaced by Fremantle after the opening of the trans-con-

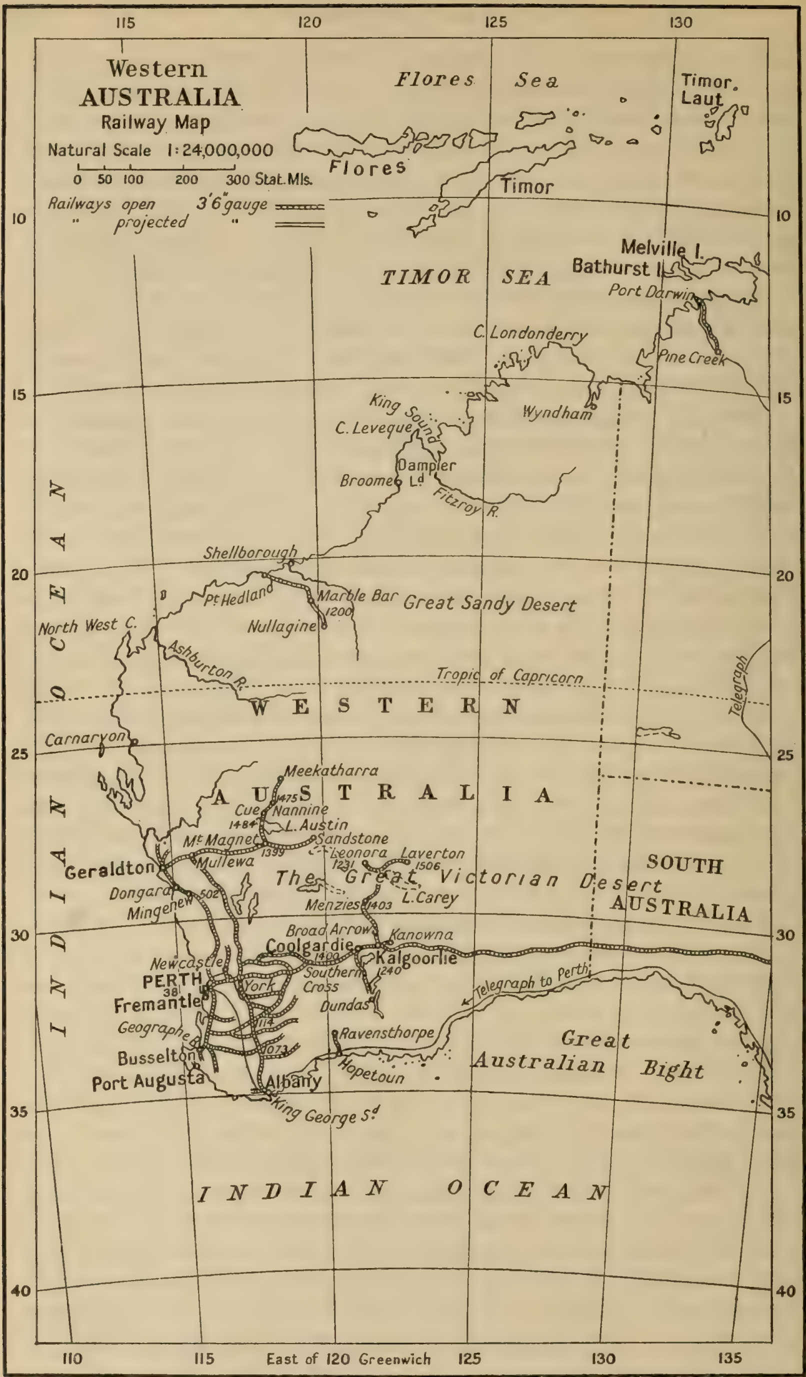
[1] This lake is 38 feet below sea-level.

Adelaide . . .	250,000

tinental line from Port Augusta in South Australia to Kalgoorlie in Western Australia, a line which, along with various state lines, completes a through rail connection between Brisbane on the east and Fremantle on the west. Burra Burra, about one hundred miles north of Adelaide, is the seat of the chief inland copper-mines, but the principal copper-mines in the colony are those of Moonta, on the peninsula between Spencer and St. Vincent gulfs. From a neighbouring port some of the ore is shipped for smelting to Newcastle in New South Wales, in vessels which bring back coal to carry on smelting at the South Australian port. As to Iron Knob see **1389.** Port Augusta is a wheat-port at the head, Port Pirie (**1395**) another on the east side, of Spencer Gulf, and Port Lincoln, a third, near the south end of Eyre's Peninsula.

1400. E.—Western Australia, the largest but the least populous of all the states. The vast deserts belonging to it will always cause it to be more imposing in extent than population, and even in the principal settled area, the district in the south-west, which receives autumn and winter rains brought by north-west winds, corresponding to the south-west winds of western Europe (**53**), the population is very sparse. This is largely owing to the character of the country. Though there is much good soil, the fertile districts are scattered, and the best land for European settlers is far from what was, till the construction of the excellent harbour of Fremantle, the only good harbour of the settled district, that of King George's Sound. Since the development of the gold-fields, however, population has rapidly increased, and all the industries for which the state offers advantages, including agriculture,[1] have been stimulated. Fine hard timber (**484**) has always been an important product of this state. The most productive gold-fields are those of Coolgardie and Kalgoorlie in about 31° S., but so far in the interior that the industry was long greatly hindered by the lack of water. A plentiful supply is now, however (since January 1903), pumped from a vast reservoir about 25 miles from Perth at a distance of 325 miles from Coolgardie and 350 from Kalgoorlie. Before the discovery of the Coolgardie gold-field in 1891 the population of Western Australia did not exceed 50,000. The Murchison gold-field, of which the chief centre is Cue, lies in about 27½° S. In the south-west of the state on the Collie River are important deposits of coal, which is exported from Bunbury, a place of export also for the hard timber of the state. In the northern parts of Western Australia pearl-fisheries are carried on along the coast, but this industry is threatened by the legislation of the Australian Commonwealth against the employment of coloured labour. The capitalists engaged in the industry contemplate, it is said, carrying it on so far as possible from Dutch New Guinea. Gold also exists in the interior of this part of Western Australia, and good pasture-lands have attracted settlers. The chief pastures are in

[1] The wheat area increased from 34,000 acres in 1890–91 to 1·7 million acres in 1915–16 (the maximum down to 1919–20).



Bartholomew, Edin.

Kimberley District, along the banks of the Fitzroy River, which flows into King Sound, about 17½° S. The capital of the state is Perth, on the Swan River, about twelve miles above its port, Fremantle, on the west coast (**1399**). Albany, on King George's Sound, 260 miles distant from Perth, is the place where the first settlement was made on West Australian territory (in 1826).

1401. The Northern Territory of Australia, embracing more than half a million square miles, was separated from South Australia and transferred to the Commonwealth on January 1, 1911. Its southern limit being lat. 26° S., by far the greater part of the area lies within the torrid zone. It is only in the peninsular portion to the north that there is a copious rainfall—40 inches and upwards per annum, occurring, of course, almost entirely in summer (**1376**). Towards the interior, here as elsewhere in Australia, the precipitation becomes very scanty, the area with as much as 20 inches of rain annually not apparently extending beyond 18° S. The part with copious rains would be well adapted for the growth of all the vegetable products of the tropics, but could not be turned to account for that purpose in the manner in which such regions are exploited elsewhere by whites without coloured labourers (**1383**). Mr. David Lindsay, who from 1873 to 1882 was surveyor to the South Australian government, contends that wheat could be grown by the white man within 200 miles from the coast, and adds that there are large areas fit for irrigation for lucerne. This would greatly benefit the live-stock industry, which is at present the only one of any importance, cattle being, as in the corresponding latitude of Queensland, the animals most largely reared.[1] Towards the south of the Territory are some well-grassed stretches, suitable for sheep, bordering the Finke and other rivers descending from the Macdonnell Ranges (on the Tropic of Cancer). Two-humped camels, carrying on the average about 550 lbs., are much used for transport. The most important mineral products are wolfram and tin ore.[2] The capital is Darwin, and the only railway in the territory is one of about 200 miles running thence up the Katherine River. The Commonwealth government has acquired the whole of the trans-continental railway designed to connect Port Augusta with Darwin, by means of which it is estimated that London would be brought within seventeen days of Adelaide, and has undertaken to complete it from its present terminus in South Australia. (See map, p. 675.) During the war meat-preserving works were erected near Darwin, but the cattle rearers find it cheaper to send their stock overland to Queensland. The maximum population, exclusive of an unknown number of aborigines, was that of 1888, when it was little more than 7,500.[3]

[1] At the end of 1918, 570,000 cattle, 59,000 sheep, 31,000 horses.
[2] But the total value of the minerals produced in 1918–19 was only £71,000.
[3] At the end of 1919, 4,700.

Perth . . . 100,000

1402. F.—Tasmania.—This state consists of the island so called, together with the smaller islands adjacent. It is separated from Victoria by Bass Strait. Like Victoria and Queensland, the state was originally a dependency of New South Wales, and the first settlement upon it was a convict establishment formed in 1803, but it was made independent in 1825. The surface of the main island is in great part high. A bleak tableland, from 2,000 to 3,000 feet in height, occupies the middle and a large part of the western half of the island, and is crowned by mountains, and cleft by deep chasms through which issue the torrents which come to form the rivers of the west coast. To the east of this tableland lies a tolerably level and open district, which forms the great grazing-ground of the state. Elsewhere the colonists have had to contend with land more or less heavily timbered. The climate is somewhat warmer than that of England, very suitable for all English crops, and specially well adapted for fruits. Copper (at Mount Lyell in the west near Macquarie Harbour), tin (at Mount Bischoff in the north-west and elsewhere), and gold are important minerals, and coal-mines and oil-shale (the latter near Latrobe in the north) are also worked. The capital is Hobart, at the end of the island furthest from Australia, an inconvenience which is, however, outweighed by the excellence of its harbour, formed by the estuary of the Derwent. Launceston is at the head of navigation on the Tamar, forty miles from the mouth of the estuary known as Port Dalrymple, on the side nearest to Australia. A new deep-water port has been formed at Ball Bay on the Tamar.

Hobart . . .	50,000

DOMINION OF NEW ZEALAND

1403. New Zealand, a colony first settled in 1840, and proclaimed a Dominion in September 1907, consists mainly of two large islands and one smaller one, situated at the distance of about 1,000 miles from the nearest points of the south-east coast of Australia. The large islands are usually known as the North and the South Island (frequently called the Middle Island), and are separated from each other by Cook Strait. The smaller island is called Stewart Island, and is separated from the South Island by Foveaux Strait. Besides the main islands just mentioned New Zealand possesses several groups of small islands at the distance of from 150 to 350 miles. The principal are the Chatham Islands to the east, the Auckland Islands to the south, and the fertile group of the Kermadec Islands to the north-east. The coast line of New Zealand is in most places high and rocky, especially on the west coast. In the extreme south-west it is broken up by numerous inlets with very steep and lofty cliffy shores, resembling the fiords of Norway.

1404. The surface of all the islands is highly mountainous. One long succession of mountains runs through both islands from the south-west to the north-east. In the South Island these mountains lie for the most part close by the west coast, and it is about the middle of this island that the highest parts of the whole series are found. These parts are called the Southern Alps, and, like the Alps of Europe, they are crowned by perpetual snow, and have their higher valleys filled with large glaciers, their lower valleys occupied by large and picturesque lakes. So difficult are these mountains to cross, that for more than a hundred miles there is no road connecting the east and west coasts of the South Island. The West Coast Road between Christchurch and Hokitika passed through a difficult defile known as the Otira Gorge, and across Arthur's Pass, more than 3,000 feet high, but this road has, since 1918, been superseded by a railway with gradients of 1 in 33 passing under Arthur's Pass in a tunnel 5·3 miles long, rising from 1,585 feet at its western to 2,435 feet at its eastern end. The loftiest peaks of the North Island are in the west, and are all of volcanic origin. They lie in one of the most remarkable volcanic regions of the world. The most extensive plains in New Zealand are those called the Canterbury Plains, which occupy the middle of the South Island on the eastern side, extending for upwards of a hundred miles from north to south, with a varying breadth.

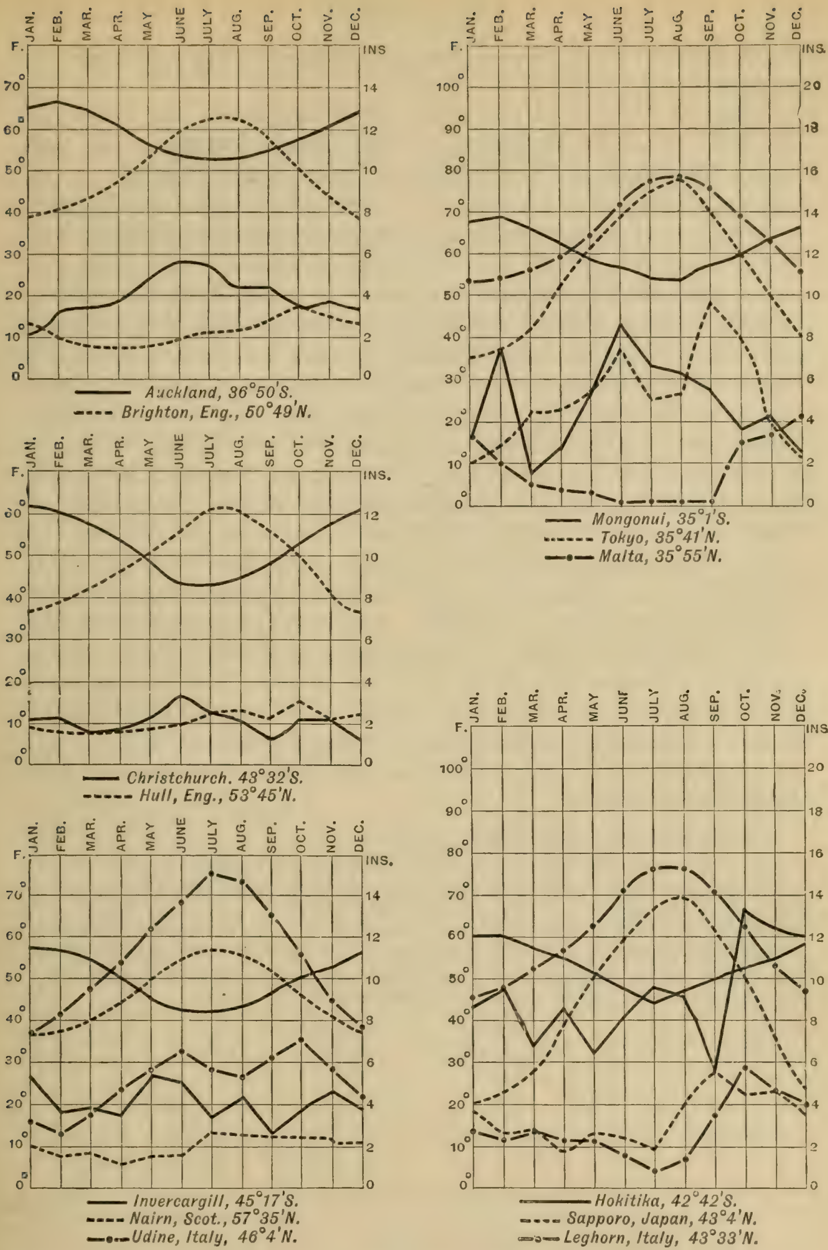
1405. The rivers of New Zealand are numerous, but the longer ones are for the most part unfit for navigation. Those of the South Island are most rapid torrents, fed in summer by the melting snows and glaciers of the Southern Alps. The chief navigable river is the Waikato, which drains Lake Taupo, and enters the sea on the west of the North Island. The Molyneux, or Clutha, a noble stream, draining south-eastwards three of the chief lakes at the base of the Southern Alps, is the largest river of the South Island.

1406. The climate of New Zealand is not characterised by the liability to droughts from which so much of Australia suffers. The winds that carry the most plentiful rains blow from the north-west, as in the south-west of Australia, so that the western slopes of the mountains and the plains at their base are plentifully supplied with rain, whereas the plains on the east have a much more scanty rainfall. Hence the forests are chiefly on the west side of the mountains, and the Canterbury Plains are the chief pastoral and agricultural region in the colony. On this side also are the principal advantages for water-power development, to promote which the Dominion passed an act in 1910.[1] The temperature, especially in summer, resembles that of England more than that of Italy, with which New Zealand corresponds in latitude. (See diagrams, opposite.) The New Zealand crops, therefore, are similar to those of England (the chief corn crops, wheat and oats), and though grapes are grown in the open air in the northern districts, wine is rarely made from them. The high average yield of wheat in New Zealand is shown in par. **242.** The more abundant rains of New Zealand cause the pastures to be richer than those of the Australian colonies, and English cultivated grasses thrive remarkably well.[2] New Zealand consequently supplies New South Wales with considerable numbers of horses and cattle, as well as butter and cheese. A further interesting illustration of the resemblance between the climate of this colony and that of England is presented by the success with which the Lincoln, Leicester, and other breeds of English sheep yielding long, strong, and lustrous wools (**315**) are reared on the New Zealand pastures. As to the trade in mutton see **488.** The minerals of New Zealand are of great value, the chief being gold and coal.

1407. The natives of New Zealand, called the Maori, are the most intelligent of all the natives whom the Europeans met with in any of the Australasian states. They are a brown-skinned, well-formed people, fond of tattooing themselves. Most of them live on the

[1] The principal installation carried out under this act is the Lake Coleridge station, in the Southern Alps, 65 miles west of Christchurch, the works including the diversion of the Harper River into the lake to increase the power. Parliament has made provision for £10,000,000 spread over several years for hydroelectric development.

[2] In 1916–17 there were nearly 15,000,000 acres in New Zealand under sown grasses, against little more than 3,000,000 in Australia (exclusive of Tasmania).



METEOROLOGICAL DATA OF STATIONS IN NEW ZEALAND, compared with data for stations (a) in Great Britain, (b) others in corresponding latitudes in the Northern Hemisphere.

Mean temperature curves above, rainfall below.
Degrees F. numbered on left, inches of rainfall on right.

North Island. Their number, formerly decreasing, has now begun to increase.[1]

1408. The capital of the colony is Wellington, in the south of the North Island on an inlet from Cook Strait, forming a safe and commodious harbour (Port Nicholson) with depths alongside of the wharves of from 16 to 41 feet. It is about 1,270 miles from Sydney. Auckland, on a narrow isthmus of the long peninsula of the North Island which runs out to the north-west, was once the seat of government. It is a calling-station for steamers from San Francisco and the Panama Canal to Sydney, and as it lies on the east side of the isthmus (the west side having only a shallow harbour), vessels from Auckland bound for Sydney have to sail round the northern end of the island. In the South Island the chief towns are Christchurch and Dunedin. Christchurch is the principal town on the Canterbury Plains. It is situated a few miles from the east coast, and separated by a tunnelled hill from its port, Lyttelton, situated on one of the inlets of Banks Peninsula. Dunedin stands at the head of an inlet further south, in the old province of Otago, and is the port of the principal gold-fields of New Zealand. Large ocean-vessels have to stop at Port Chalmers, at the mouth of the inlet. Invercargill is the chief town on Foveaux Strait; its port, for large vessels, is Bluff Harbour. Greymouth and Westport are the ports of the principal New Zealand coal-fields, on the west side of the South Island. The coal obtained from the Brunner mine and dispatched from the former port is of high quality. As a steam-coal it is said to be 20 per cent. better than the best New South Wales coal.[2]

[1] In 1896, 40,000; in 1916, close on 50,000.

[2] On November 19, 1903, New Zealand adopted a preferential tariff in favour of the mother country by dividing certain imported commodities into three classes, and raising the duties on these or laying duties on them against foreigners, but not against the mother country. It may be mentioned, however, that in this list the principal imports from the United Kingdom, woollen and cotton goods, apparel and hosiery, are not included. The percentage of imports affected by the preference has increased since the tariff changes of 1907 and 1917.

Wellington	100,000	Christchurch	100,000
Auckland	150,000	Dunedin	73,000

THE PACIFIC ISLANDS OUTSIDE OF AUSTRALASIA

1409. NEW GUINEA, which is of about the same size as New South Wales, is the largest island in the world, with the exception of Australia. Its western half, as far as the meridian of 141° E., has long been claimed by the Dutch, but till recently its eastern half was independent. Now, however, this portion has also been declared to be under the protection of European Powers. In May 1885 the southern portion of the eastern half, together with the Louisiade Archipelago, was declared under British, the northern under German, influence. In September 1888 the section under British influence was formally erected into a British Crown colony, but it has been handed over to the Commonwealth of Australia and is now officially known as Papua.[1] The German section, now known officially as New Guinea, has been assigned to Australia by a mandate of the League of Nations issued in December 1920.

1410. The surface of the island is in many parts mountainous. The whole of the narrow south-eastern extremity (which lies almost entirely within the British protectorate) is traversed by chains of mountains, known as the Owen Stanley Range, with peaks upwards of 13,000 feet high. Lying within the monsoon area, the whole island receives copious rains during about half the year (**55**), and, like other tropical countries with an abundant rainfall, New Guinea is covered with dense forests, which are one of the chief causes why the interior of the island is as yet so little known. Two great navigable rivers have indeed been ascended for hundreds of miles into the interior. One of these is the **Fly**, which forms a great delta on the western side of the Gulf of Papua in British territory. The other is the Sepik (called by the Germans the Kaiserin Augusta), which enters the sea near the middle of the north-eastern coast-line. Neither of these rivers has as yet, however, served as the means of gaining much knowledge of the land beyond its banks.

1411. Like other uncivilised natives of tropical countries, the inhabitants of New Guinea are very indolent. The food-plants which they grow are mainly such as require but little cultivation—bananas, yams, sugar-cane, coco-nuts, and taro; but in addition to these tobacco is also grown, and is indeed so highly prized that it is the chief article of barter with the natives. The trade is very trifling; the chief

[1] In 1903 the Legislature of the Commonwealth passed an act providing for the administration of British New Guinea, towards which the Commonwealth is to furnish a sum not exceeding £20,000 a year.

exports are trepang (**508**), pearl-shell (**496**), and copra (**462**). The supplies of the two former are becoming exhausted. The difficulty of obtaining labourers will probably prove a great obstacle in the way of creating export products of a more lucrative kind, such as are produced in Ceylon and Jamaica. Alluvial gold-fields are worked by Europeans, chiefly in the Louisiade Archipelago. In Papua the great bulk of the land is held to belong to the natives and private purchases from them are forbidden. The government is the sole legal purchaser, and grants leasehold tenures to planters.[1]

1412. Mission stations have existed for many years at different points of the coast now under the protection of Great Britain, and in the schools belonging to the stations many native children are educated, many of the teachers being natives of other islands of the Pacific. The seat of administration of British New Guinea is at Port Moresby, which lies to the east of the Gulf of Papua, and has regular steam communication with several ports in Queensland. It lies behind a long barrier reef which skirts the whole of this part of the New Guinea coast, access being obtained to it by one of the numerous deep channels by which this reef, like the Great Barrier Reef of the neighbouring coast of Australia (**1370**), is crossed.

1413. MELANESIA.—This name, meaning 'islands of the blacks,' is applied to several groups of small islands to the east and south-east of New Guinea, inhabited by Papuans.

The islands of New Britain, New Ireland, the Admiralty group, and others to the north of the eastern end of New Guinea, once known as the Bismarck Archipelago, belonged before the war to Germany, to which also belonged a portion of the Solomon Islands, the remainder of which were British, the New Hebrides, and New Caledonia. The last-mentioned island, one of the chief sources of nickel (**571·7**) along with the adjacent group of the Loyalty Islands to the east, belong to the French. It is skirted all round by a long line of coral reefs, which stretch for a considerable distance to the north-west, enclosing a number of small islands. Numea or Noumea, in the south-west of the island, is a port of call for the vessels of the French line of steamers which visit the ports of Australia. The former German islands of the Solomon group passed by mandate to Australia with German New Guinea, but the others remain a British protectorate. The New Hebrides are under the joint protection of the British and French, neither power having the right to form settlements on the islands.

1414. POLYNESIA.—The name is applied to all the small islands of the Pacific Ocean, with the exception of those already mentioned. They are almost all situated within the tropics, and the chief food of the people, in addition to those already mentioned as cultivated in New Guinea, is the bread-fruit. Of most of them the chief commercial product is copra (**462**). A few of them have a very high value on

[1] In 1919 the area under lease was 219,000 acres, of which upwards of 58,000 acres were in plantations.

account of their phosphatic guanos (571·11*d*), none more so than the small islands of Nauru and Ocean just south of the equator to the west of the Gilbert group, both now British. Nauru, formerly German, was assigned to the British Empire by mandate, and it has been agreed that Australia is to appoint the first administrator for a term of five years. The people belong to a physically fine tall race with a clear brown skin and smooth hair, the race which includes the Maori (**1407**) and is now classed by ethnologists as a member of the great Caucasic stock. Christianity has been introduced with considerable success on many of the islands.

1415. The **Fiji Islands** are a group composed mainly of volcanic islands situated to the north of New Zealand, and mostly lying between the parallels of 16° and 19° S. Their total area is rather larger than that of Wales, and Viti Levu, the largest of the islands, embraces more than half the land-surface belonging to the group. The islands were ceded in 1874 by their native king to Britain, and now form a British Crown colony. Even before that time people of European origin had established plantations of tropical crops on several of the islands, and since that date the products of such plantations (chiefly sugar, but also coco-nut, maize, tobacco, coffee, and cotton) have increased very greatly, and a large trade has thus grown up. The plantation labourers are partly natives of the islands themselves; but Polynesian labourers and Indian coolies have been introduced. The chief towns of the group are seaports with fine harbours protected by coral reefs. The capital is Suva, in the south-east of Viti Levu. The next in importance is Levuka, the former capital, on a small island to the east of Viti Levu. The small island of Rotumah, to the north of the Fiji group, is also British and is annexed to the colony of Fiji.[1]

1416. The Tonga and Samoan, or Navigator Islands, lie to the east of the Fiji group, and still further east are the Cook or Hervey Islands, the Society and Low Islands. In 1888 the British flag was hoisted on the Hervey group, the principal of which is Rarotonga, and the whole group is now incorporated in the Dominion of New Zealand. To the north of this group in about 9° S. lies Penrhyn Island, now also British, and still further north (between 0° and 5° N. and east of 160° W.) lie two other small islands now British, Fanning Island and Christmas Island. All three yield pearl-shell and copra, and are of importance as lying on the route of the telegraph cable to New Zealand and Australia (see map, pp. 90–91). In 1899 the Samoan Islands were divided between the German Empire and the United States, the German Empire receiving the islands of Savaii and Upolu, the latter containing the port of Apia, long the centre of German trade with the Pacific Islands, the chief product of which for European markets is copra. The United States obtained Tutuila with the fine

[1] The total population of the group in 1891 was 124,000 (Europeans, 2,036; Fijians, about 111,000; Indians, 7,500; Polynesians, 2,300); in 1901, 118,000 (Europeans, 2,447); in 1911, 140,000 (Europeans, 3,707).

natural harbour of Pago-pago (pronounced Pango-pango). The former German portion of the group has been placed under the administration of New Zealand. At the same time the right of the British to the Tonga Islands was recognised. The Society Islands, of which the most important is the charming volcanic island of Tahiti, are under French protection, and so also are the Low Islands and the Marquésas group, to the north of the latter.

1417. Between the equator and 15° N. are the Pelew, Caroline, and Marshall Islands, in that order from west to east, and, north of the Carolines, the Marianne or Ladrone Islands. All these, with the exception of the island of Guam, the largest of the Ladrones, formerly belonged to the Germans, and have, with the same exception, been assigned by mandate to the Japanese.[1] Guam was ceded by Spain to the United States, and has been made a naval station. The Gilbert Islands to the south of the Marshall group and the Ellice Islands further to the south form, since 1892, a British protectorate, of which the seat of administration is in Ocean Island (**1414**).

1418. The **Hawaiian Islands**[2] are an important group of volcanic islands nearer the coast of North America, between 19° N. and the Tropic of Cancer, belonging since 1898 to the United States, in which since 1900 it holds the position of a territory, thus sharing its customs tariff. In area they are about equal to the Fiji Islands, which they resemble in the nature of their products. The chief island is Hawaii, on which the extinct volcano of Mauna Kea rises to the height of nearly 14,000 feet. Even before the group was annexed to the United States, sugar, molasses, and rice were admitted from the Hawaiian Islands into that country duty-free. Wheat, flour, and pork are the principal articles which the islands take in return. Under the treaty, concluded in 1876, providing for the duty-free imports just mentioned there was a rapid increase in the import of raw sugar from this group into the United States, and the increase is still going on. The plantations all belong to people of European stock, but the labourers are immigrants. Koreans are beginning to arrive. The natives are an apparently joyous, but at heart a dispirited and dwindling race.[3] The capital, Honolulu, on the island of Oahu, is one of the landing-places of the Pacific cable belonging to the United States.

[1] The assignment of the Caroline Islands to the Japanese involves the placing under that power the island of Yap in the western part of the archipelago north of the Pelew Islands. Protests were made by the United States' government, but an agreement assuring to the United States security for a cable station on the island was arrived at.

[2] This is the sole name by which the group, long known in England as the Sandwich Islands, is known in the United States.

[3] At the census of 1920 the total population of the group was 256,000, of whom the great majority contained no Hawaiian blood. Of these about 44 per cent. were Japanese, 10 per cent. Portuguese, while Filipinos and Chinese were each represented by about 9 per cent.

Honolulu . . . 85,000

APPENDIX

General Commerce = Gross Imports and Exports.

Special Commerce = Imports of Articles for home consumption, and Exports of Native Produce and Manufactures. (All articles that have paid customs duty are often included under the head of Special Commerce. See also the notes to individual tables.)

The percentages in these tables are in most cases calculated on more precise values than those given in the tables.

UNITED KINGDOM

GENERAL IMPORTS, EXCLUDING DIAMONDS AND BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentage of Total Value.									Change % 1919 on 1911–13.	
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	Value.	Quant.
1. Grain and flour [1]	53·75	63·90	62·67	53·12	57·79	61·08	67·61	75·29	83·25	14·9	16·7	15·7	13·6	13·8	12·9	12·5	12·0	11·4	—	—
Wheat	*26·15*	*29·31*	*28·24*	*21·47*	*23·33*	*23·36*	*29·93*	*39·55*	*43·07*	*7·2*	*7·6*	*7·0*	*5·5*	*5·6*	*4·9*	*5·5*	*6·3*	*5·9*	+ 59	−32
Maize	*7·48*	*11·24*	*8·62*	*8·10*	*8·30*	*11·04*	*11·57*	*11·88*	*12·69*	*2·1*	*2·9*	*2·2*	*2·1*	*2·0*	*2·3*	*2·1*	*1·9*	*1·7*	+ 8	−62
Wheat meal and flour	*4·79*	*7·10*	*10·40*	*9·08*	*9·58*	*10·24*	*8·46*	*6·49*	*5·71*	*1·3*	*1·8*	*2·6*	*2·3*	*2·3*	*2·1*	*1·6*	*1·0*	*0·8*	+350	+65
2. Raw Cotton	52·19	37·61	43·29	41·34	35·61	34·25	46·97	62·81	73·99	14·4	9·8	10·8	10·6	8·5	7·2	8·7	10·0	10·1	+158	−18
3. Meat	12·94	20·91	25·36	25·55	31·41	41·22	49·41	49·97	51·84	3·6	5·5	6·3	6·6	7·5	8·7	9·1	7·9	7·1	—	—
Fresh beef and mutton	—	—	*3·13*	*4·63*	*8·06*	*11·59*	*15·54*	*18·92*	*23·69*	—	—	*0·8*	*1·2*	*1·9*	*2·4*	*2·9*	*3·0*	*3·2*	+105	−21
Bacon and hams	*5·21*	*8·81*	*9·19*	*9·02*	*10·68*	*13·65*	*16·80*	*17·32*	*18·39*	*1·4*	*2·3*	*2·3*	*2·3*	*2·6*	*2·9*	*3·1*	*2·8*	*2·5*	+388	+77
Animals	*5·37*	*7·44*	*9·72*	*8·46*	*8·60*	*10·27*	*9·54*	*6·89*	*1·72*	*1·5*	*1·9*	*2·4*	*2·2*	*2·1*	*2·2*	*1·8*	*1·1*	*0·2*	—	—
4. Wool, sheep, alpaca, &c.	20·11	24·25	24·73	25·76	26·24	23·97	21·53	31·00	33·74	5·6	6·3	6·2	6·6	6·3	5·1	4·0	4·9	4·6	+189	+ 30
5. Butter and margarine	7·51	10·34	11·72	12·55	16·11	19·10	23·20	25·82	27·64	2·1	2·7	2·9	3·2	3·9	4·0	4·3	4·1	3·8	− 20	−63
6. Wood, total	16·75	16·51	16·40	15·76	16·72	23·84	24·76	25·74	29·34	4·6	4·3	4·1	4·0	4·0	5·0	4·6	4·1	4·0	+ 15	—
7. Sugar	20·36	22·67	22·42	18·19	19·71	17·77	17·45	20·54	24·93	5·6	5·9	5·6	4·6	4·7	3·7	3·2	3·3	3·4	+116	−14
Refined	*3·69*	*4·65*	*4·35*	*6·76*	*9·85*	*10·69*	*10·86*	*12·04*	*13·36*	*1·0*	*1·2*	*1·1*	*1·7*	*2·4*	*2·2*	*2·0*	*1·9*	*1·8*	+ 44	−48
Raw	*16·67*	*18·02*	*18·07*	*11·43*	*9·86*	*7·08*	*6·59*	*8·50*	*11·58*	*4·6*	*4·7*	*4·5*	*2·9*	*2·4*	*1·5*	*1·2*	*1·3*	*1·6*	+200	−18
8. Rubber	1·62	1·67	2·58	2·67	3·34	5·73	7·02	13·88	20·15	0·4	0·4	0·6	0·7	0·8	1·2	1·3	2·2	2·8	+ 21	+83
9. Silk yarn and manufs.[2]	10·58	12·87	11·21	11·36	12·85	16·51	13·48	12·95	13·95	2·9	3·4	2·8	2·9	3·1	3·5	2·5	2·1	1·9	—	—
10. Oil-seeds and nuts	7·60	8·28	8·47	7·46	7·28	6·83	8·69	11·97	14·66	2·1	2·2	2·1	1·9	1·7	1·4	1·6	1·9	2·0	+278	—
11. Hides, skins and furs, raw	6·72	5·66	6·63	6·24	6·52	7·12	7·61	11·08	13·29	1·9	1·5	1·7	1·6	1·6	1·5	1·4	1·8	1·8	+122	—
Hides	*4·46*	*3·41*	*3·70*	*3·07*	*2·35*	*2·82*	*2·35*	*3·46*	*5·08*	*1·2*	*0·9*	*0·9*	*0·8*	*0·6*	*0·6*	*0·4*	*0·5*	*0·7*	+169	+20
Sheep and goat skins	*1·24*	*1·06*	*1·40*	*1·72*	*2·44*	*2·64*	*3·10*	*4·36*	*4·28*	*0·3*	*0·3*	*0·4*	*0·4*	*0·6*	*0·6*	*0·6*	*0·7*	*0·6*	+129	—
12. Tea	12·24	12·22	10·98	10·24	10·18	10·52	9·32	10·88	13·30	3·4	3·2	2·7	2·6	2·4	2·2	1·7	1·7	1·8	+149	+38
13. Chemicals	9·91	9·55	11·61	9·67	8·64	8·42	9·15	10·76	12·29	2·8	2·5	2·9	3·0	2·1	1·8	1·7	1·7	1·7	—	—
Coal tar dyes	—	—	*0·46*	*0·57*	*0·59*	*0·72*	*1·13*	*1·63*	*1·82*	—	—	*0·1*	*0·1*	*0·1*	*0·2*	*0·2*	*0·3*	*0·2*	+0·2	−82
14. Fresh fruit and nuts	2·75	3·82	4·37	4·65	5·74	7·08	9·46	10·48	10·85	0·8	1·0	1·1	1·2	1·4	1·5	1·7	1·7	1·5	+174	—
15. Woollen yarn and manufactures to '03 [2]	5·67	7·63	8·40	11·07	12·11	12·23	12·45	—	—	1·6	2·0	2·1	2·8	2·9	2·6	2·4	—	—	—	—
ex. apparel from 1904.	—	—	—	—	—	—	11·74	10·34	10·06	—	—	—	—	—	—	2·1	1·6	1·4	− 92	−97
16. Cotton yarn and manufs.[2]	—	—	—	—	4·19	5·63	7·38	9·95	11·68	—	—	—	—	1·0	1·2	1·4	1·6	1·6	− 59	−90
17. Leather	2·82	3·98	5·35	6·02	6·95	8·08	8·13	9·41	10·73	0·8	1·0	1·3	1·5	1·7	1·7	1·5	1·5	1·5	+248	+54
18. Iron and steel manufactures }	—	—	—	4·24	4·34	5·60	8·19	8·06	13·11	—	—	—	1·1	1·0	1·2	1·5	1·3	1·8	− 14	−75
Machinery }						3·14	4·40	4·78	6·62						0·6	0·8	0·8	0·9	+127	− 6
19. Eggs	2·08	2·43	2·66	3·12	3·79	4·69	6·39	7·19	8·65	0·6	0·6	0·7	0·8	0·9	1·0	1·2	1·1	1·2	− 0	−72
20. Flax and hemp, raw, and tow	7·52	5·89	5·51	5·49	5·20	5·43	7·27	7·09	8·38	2·1	1·5	1·4	1·4	1·2	1·1	1·3	1·1	1·1	+ 43	−44
21. Cheese	3·93	4·57	4·79	4·48	5·11	5·62	6·38	6·97	7·20	1·1	1·2	1·2	1·1	1·2	1·2	1·2	1·1	1·0	+111	− 9
22. Tin	1·13	1·21	2·23	2·81	2·71	2·59	4·68	6·90	8·99	0·3	0·3	0·6	0·7	0·6	0·5	0·9	1·1	1·2	− 34	−49
23. Copper	3·28	2·91	2·29	2·36	2·10	4·01	4·77	6·88	6·93	0·9	0·8	0·6	0·6	0·5	0·8	0·9	1·1	0·9	+ 88	+14
26. Iron ores	0·85	1·41	2·45	2·71	2·78	4·65	4·87	5·98	6·24	0·2	0·4	0·6	0·7	0·7	1·0	0·9	0·9	0·9	+ 81	−23
Average total value	360·20	382·50	399·60	389·60	417·80	474·30	541·80	629·90	731·20											

[1] Excluding locust-beans from 1901, value 1901–5 £0·20, 1906–10 £0·23; including lentils from 1902, value 1902–5 £0·05, 1906–10 £0·08 million.
[2] Apparel is a separate item from 1903, formerly included under silks, woollens, &c., value 1906–10 £3·28 millions.

UNITED KINGDOM

EXPORTS OF NATIVE PRODUCE AND MANUFACTURES

Principal Articles.	Average Value in Millions Sterling.									Percentages.									Change % 1919 on 1911–13.	
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	Value.	Quant.
1. Cotton manufactures[1]	75·26	68·45	74·20	71·35	66·29	67·11	79·13	100·88	123·15	31·3	33·9	31·9[1]	30·2	29·2	26·9	27·2	26·0	25·6	—	—
Yarn	*15·06*	*12·39*	*13·04*	*11·72*	*9·70*	*8·94*	*8·41*	*13·05*	*15·63*	*6·2*	*6·1*	*5·6*	*5·0*	*4·3*	*3·6*	*2·9*	*3·4*	*3·3*	+117	−28
Thread	*1·52*	*1·88*	*2·39*	*2·89*	*3·04*	*3·52*	*3·60*	*4·45*	*3·87*	*0·6*	*0·9*	*1·0*	*1·2*	*1·3*	*1·4*	*1·2*	*1·1*	*0·8*	+147	−11
2. Iron and steel	30·94	20·95	26·43	26·28	21·22	25·92	29·09	41·84[2]	49·97	12·9	10·4	11·4	11·1	9·4	10·4	10·0	10·8	10·4	+ 29	−60
3. Coal, coke, &c.	10·30	7·93	10·09	13·03	16·58	22·33	27·62	38·04	44·90	4·3	3·9	4·3	5·5	7·3	9·0	9·5	9·8	9·3	+106	−45
4. Woollen manufactures	—	—	—	—	24·39	24·18	24·79	32·81	38·28	—	—	—	—	10·7	9·7	8·5	8·4	8·0	—	—
Tissues	*25·87*	*17·16*	*18·83*[1]	*20·41*	*17·30*	*15·68*	*16·59*	*21·52*	*25·79*	*10·8*	*8·5*	*8·1*[1]	*8·6*	*7·6*	*6·3*	*5·7*	*5·5*	*5·4*	+249	− 6
Yarn, woollen and worsted	*5·65*	*3·79*	*3·63*	*4·17*	*4·52*	*4·91*	*3·93*	*5·50*	*5·95*	*2·3*	*1·8*	*1·5*	*1·8*	*2·0*	*2·0*	*1·4*	*1·4*	*1·2*	+101	−53
Yarn, alpaca, mohair, &c.	—	—	*0·99*	*1·16*	*1·40*	*1·71*	*1·76*	*2·32*	*2·45*	—	—	*0·4*	*0·5*	*0·6*	*0·7*	*0·6*	*0·6*	*0·5*	− 59	−86
Tops	—	—	—	—	*0·70*	*1·46*	*2·07*	*2·92*	*3·37*	—	—	—	—	*0·3*	*0·6*	*0·7*	*0·8*	0·7	− 4	−65
5. Machinery and engines	8·60	7·59	11·89	13·18	14·60	18·19	20·19	29·37	33·71	3·6	3·7	5·1	5·6	6·4	7·3	6·9	7·6	7·0	− 3	−57
6. Chemicals, drugs, dyes	7·48	7·86	9·73	10·01	11·52	12·16	13·32	16·84	21·02	3·1	3·9	4·2	4·2	5·1	4·9	4·5	4·3	4·3	—	—
Coal products, not dyes	*0·38*	*0·48*	*0·86*	*0·96*	*1·40*	*1·68*	*1·31*[3]	*1·53*	*2·26*	*0·2*	*0·2*	*0·4*	*0·4*	*0·6*	*0·7*	*0·4*	*0·4*	*0·5*	—	—
7. Linen yarn and manufactures	9·46	6·86	6·52	6·45	5·91	5·85	6·48	8·26	9·40	3·9	3·4	2·7	2·7	2·6	2·3	2·2	2·1	1·9	+ 32	−62[6]
8. Apparel & haberdashery	9·16	6·85	7·42	6·73	6·15	6·48	7·08	7·02	10·26	3·8	3·4	3·1	2·8	2·7	2·6	2·4	1·8	2·1	—	—
9. Leather manufactures, including boots	3·65	3·30	4·04	3·97	3·84	3·86	4·77	6·14	8·51	1·5	1·6	1·7	1·7	1·7	1·5	1·6	1·6	1·8	+ 52	−30[7]
10. Hardware, implements, &c.	—	—	4·78	4·39	3·70	3·97	4·64	5·08	6·73	—	—	2·1	1·9	1·6	1·6	1·6	1·3	1·4	—	—
Cutlery and hardware	*4·54*	*3·33*	*3·54*	*2·94*	*2·09*	*2·10*	*2·11*	*2·19*	*2·38*	*1·9*	*1·6*	*1·5*	*1·2*	*0·9*	*0·8*	*0·7*	*0·6*	*0·5*	—	—
11. Fish	1·26	1·36	1·89	1·67	1·89	2·51	3·56	4·85	6·88	0·5	0·7	0·8	0·7	0·8	1·0	1·2	1·2	1·4	− 32	−74
12. Earthenware and glass	—	—	—	—	2·74	2·87	3·13	3·89	4·97	—	—	—	—	1·2	1·2	1·1	1·0	1·0	—	—
China	—	—	—	—	*1·83*	*1·78*	*1·81*	*2·22*	*2·86*	—	—	—	—	*0·8*	*0·7*	*0·6*	*0·6*	*0·6*	+ 25	−53
13. Copper and yellow metal	2·97	3·10	3·40	3·22	3·16	2·91	3·37	3·66	3·31	1·2	1·5	1·4	1·4	1·4	1·2	1·2	0·9	0·7	+ 19	−25[8]
14. Jute yarn and manufactures	1·68	1·99	2·60	2·57	2·71	2·52	2·62	3·25	3·54	0·7	1·0	1·1	1·1	1·2	1·0	0·9	0·8	0·7	+ 94	−31[6]
15. Spirits[4]	0·21	0·42	0·81	1·12	1·36	2·01	2·73	3·14	4·07	0·1	0·2	0·3	0·5	0·6	0·8	0·9	0·8	0·8	+ 10	−67
16. Electrical goods, excluding machinery[5]	—	—	—	—	—	—	2·74	2·63	4·18	—	—	—	—	—	—	0·9	0·7	0·9	—	—
17. Books	0·87	0·92	1·15	1·23	1·28	1·38	1·74	2·10	2·78	0·4	0·5	0·5	0·5	0·6	0·6	0·6	0·5	0·6	− 3	−50
18. Silk yarn and manufactures	3·34	2·55	3·07	2·84	1·89	1·84	1·77	2·08	2·25	1·4	1·3	1·3	1·2	0·8	0·7	0·6	0·5	0·5	+ 89	−27[6]
19. Beer and ale[4]	2·18	1·81	1·74	1·74	1·57	1·65	1·75	1·79	2·08	0·9	0·9	0·7	0·7	0·7	0·7	0·6	0·5	0·4	− 26	−64
Average aggregate value	239·50	201·40	232·30	236·30	227·00	249·10	291·10	388·70	481·00											
New ships from 1899	—	—	—	—	—	8·89	5·84	8·79	7·91											
Average total value	—	—	—	—	—	—	297·00	397·50	488·90											

[1] Large quantities of piece goods of mixed materials in which wool predominated were erroneously entered as cotton prior to 1884, annual value about £500,000.
[2] In 1906–10 'Iron and steel' includes 'tyres, wheels, axles' to the value £1·08 million, also a small amount of old rails and telegraph wire.
[3] Peat and shale products (naphtha, paraffin, &c.) excluded in 1901, annual value about £500,000.
[4] Ex-ship stores. [5] Telegraph wire was transferred in 1903 to 'iron and steel.' [6] Piece goods. [7] Leather. [8] Copper.

UNITED KINGDOM

EXPORTS OF FOREIGN AND COLONIAL PRODUCE

Principal Articles.	Average Value in Millions Sterling.									Percentages.									Change % 1919 on 1911–13.	
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'71–75	'76–80	'81–86	'86–90	'91–96	'96–00	'01–05	'06–10	11–13	Value.	Quant.
1. Wool, exc. mohair, &c..	9·62	12·79	15·26	13·91	14·93	10·68	10·35	13·57	13·58	16·5	22·6	24·2	22·4	24·7	17·5	14·7	15·0	12·6	+ 71	−46
2. Rubber . . .	0·59	0·82	1·25	1·42	1·81	3·51	4·65	8·42	14·86	1·0	1·4	1·9	2·3	3·0	5·7	6·6	9·3	13·8	− 6	+62
3. Raw cotton . .	8·13	4·35	5·27	5·17	4·23	4·21	6·42	8·40	10·15	13·9	7·7	8·3	8·3	7·0	6·9	9·1	9·3	9·4	+ 12	−58
4. Hides and skins, raw, and furs [1] . .	2·26	1·93	2·56	2·97	3·44	4·36	4·54	6·38	7·67	3·9	3·4	4·1	4·8	5·7	7·1	6·5	7·1	7·1	—	—
Raw hides . . .	1·47	1·28	1·66	1·43	0·95	1·25	0·80	1·21	1·88	2·5	2·3	2·6	2·3	1·6	2·0	1·1	1·3	1·7	+127	− 1
Raw sheep- and goat-skins	0·17	0·26	0·46	0·66	1·31	1·66	2·04	2·59	2·48	0·3	0·5	0·7	1·1	2·2	2·7	2·9	2·9	2·3	+ 68	−29[2]
5. Tin	0·28	0·50	1·16	1·55	1·48	1·54	3·15	4·77	6·44	0·5	0·9	1·8	2·5	2·4	2·5	4·5	5·3	6·0	− 59	−69
6. Cottons	—	—	—	—	0·46	0·63	1·01	2·59	2·27	—	—	—	—	0·8	1·0	1·4	2·9	2·1	− 47	−83[3]
7. Jute	0·68	0·81	1·13	1·41	1·41	1·36	1·57	2·28	2·93	1·1	1·4	1·8	2·3	2·3	2·2	2·2	2·5	2·7	− 29	−71
8. Tea	2·82	2·47	2·39	1·84	1·49	1·52	1·77	2·16	2·61	4·8	4·3	3·8	3·0	2·5	2·5	2·5	2·4	2·4	+ 4	−44
9. Tallow and stearine .	0·17	0·23	0·41	0·40	0·77	1·04	1·15	1·74	1·77	0·3	0·4	0·7	0·6	1·3	1·7	1·6	1·9	1·6	+ 19	−57
10. Jute manufactures . .	—	—	—	—	—	1·35	1·84	1·69	1·46	—	—	—	—	—	2·2	2·6	1·9	1·4	—	—
11. Leather . . .	0·56	1·13	1·10	1·53	1·68	1·81	1·36	1·66	1·95	1·0	2·0	1·7	2·5	2·8	3·0	1·9	1·8	1·8	+ 59	− 9
12. Grain and flour . .	2·52	2·74	2·61	1·88	1·83	1·72	1·18	1·56	1·72	4·3	4·8	4·1	3·0	3·0	2·8	1·7	1·7	1·6	—	—
Rice	1·95	2·01	1·72	1·29	1·22	0·99	0·80	0·85	0·76	3·4	3·6	2·7	2·1	2·0	1·6	1·1	0·9	0·7	− 2	−60
Wheat and flour . .	0·45	0·49	0·51	0·32	0·30	0·32	0·15	0·24	0·30	0·8	0·9	0·8	0·5	0·5	0·5	0·2	0·2	0·3	− 43	−80
13. Coffee	5·20	5·37	3·43	2·78	2·31	1·98	1·77	1·54	1·86	8·9	9·5	5·4	4·5	3·8	3·2	2·5	1·7	1·7	+110	+14
14. Feathers, ornamental .	0·14	0·38	0·79	0·44	0·45	0·59	0·77	1·47	1·97	0·2	0·7	1·3	0·7	0·7	1·0	1·1	1·6	1·8	− 68	−68
15. Silks, excluding lace .	0·41	0·25	0·45	0·76	0·72	0·83	1·10	1·46	1·63	0·7	0·4	0·7	1·2	1·2	1·4	1·5	1·6	1·5	+116	− 7[4]
16. Copper	1·50	1·08	0·70	1·07	0·50	0·99	0·95	1·45	1·22	2·6	1·9	1·1	1·7	0·8	1·6	1·4	1·6	1·1	—	—
17. Hemp, dressed and raw	0·24	0·24	0·44	0·95	0·96	0·95	1·70	1·25	1·33	0·4	0·4	0·7	1·5	1·6	1·5	2·4	1·4	1·2	+153	−12
18. Gums	0·61	0·48	0·67	0·62	0·73	0·74	1·05	1·13	1·01	1·0	0·9	1·1	1·0	1·2	1·2	1·5	1·2	0·9	—	—
Wine	0·87	0·64	0·57	0·59	0·54	0·49	0·49	0·45	0·51	1·5	1·1	0·9	1·0	0·9	0·8	0·7	0·5	0·5	+ 37	−34
Indigo	1·84	1·32	1·65	1·12	0·82	0·66	0·21	0·07	0·04	3·1	2·3	2·6	1·8	1·4	1·1	0·3	0·1	0·0	+176	+ 1
Raw silk	3·28	1·50	0·47	0·20	0·06	0·07	0·12	0·04	0·10	5·6	2·6	0·7	0·3	0·1	0·1	0·2	0·0	0·1	+ 78	−36
Average total value and percentage of gross exports .	58·18	56·57	63·04	62·20	60·53	61·01	70·26	90·35	108·00	19·5	21·5	21·3	20·8	21·1	19·7	19·4	18·9	18·3		
Average gross exports, ex. ships	297·70	258·00	295·30	298·50	287·50	310·10	361·40	479·00	589·00											

[1] For 1871–5 excluding sheep skins; furs include dressed and undressed to 1902 inclusive, thereafter undressed only, average value dressed furs 1903–5 £0·65; 1906–10 £0·48 million.
[2] Goat skins only. [3] Piece goods only. [4] Broadstuffs.

UNITED KINGDOM

COUNTRIES OF ORIGIN OF IMPORTS: PERCENTAGES OF TOTAL VALUE

From	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'11–13[1]
All Brit. Possessions	*22·2*	*22·1*	*23·5*	*22·9*	*22·9*	*21·2*	*21·2*	*23·7*	*25·0*	*25·0*
1. United States .	18·4	23·1	23·2	22·4	23·0	25·5	23·1	19·9	18·5	18·2
2. France . . .	11·6	11·1	9·6	10·4	10·7	11·0	9·4	8·2	7·2	6·1
3. Germany . .	5·6	6·1	6·2	6·5	6·4	6·0	6·3	6·2	6·2	9·8
4. India . . .	8·6	7·5	8·9	8·3	6·8	5·6	5·9	6·0	6·7	6·7
5. Netherlands . .	3·9	5·5	6·2	6·6	6·8	6·2	6·4	6·0	6·5	2·9
6. Russia . . .	6·2	4·7	4·5	5·5	5·1	4·4	5·3	5·4	5·5	5·7
7. Australia . 13. New Zealand.	4·8	5·9	6·5	6·5	5·6 1·9	4·6 2·0	4·1 2·2	5·2 2·8	5·2 2·7	5·2 2·7
8. Argentine Republic	0·5	0·3	0·3	0·7	1·3	2·0	3·5	4·7	5·0	5·0
9. Belgium . .	3·9	3·2	3·6	4·1	4·1	4·5	5·0	4·6	5·2	3·1
10. British N. America.	2·9	3·0	2·8	2·8	3·2	4·2	4·5	4·5	3·9	3·9
11. Egypt . . .	3·8	2·4	2·3	2·0	2·3	2·2	2·5	3·1	3·1	3·1
12. Denmark . .	1·0	1·2	1·3	1·7	2·1	2·5	2·9	3·0	3·1	3·1
14. Sweden and Norway	2·6	2·6	2·8	2·9	2·9	3·2	2·9	2·7	2·7	2·7
15. Spain . . .	2·5	2·5	2·6	2·8	2·6	2·9	2·6	2·3	1·9	1·9
16. Brazil . . .	2·1	1·4	1·4	1·2	1·0	0·9	1·2	1·7	1·4	1·4
17. Straits Settlements	0·9	0·7	1·1	1·3	1·1	1·0	1·2	1·4	2·0	2·4
18. Cape and Natal .	1·1	1·2	1·4	1·4	1·3	1·1	1·0	1·3	1·5	1·5
19. Chile . . .	1·3	0·9	0·7	0·7	0·9	0·8	0·9	1·0	0·9	0·7
20. Ceylon . . .	1·0	0·9	0·6	0·7	1·0	1·0	0·8	0·8	1·0	1·0
21. China & Hong-Kong	3·6	3·8	2·8	2·0	1·1	0·8	0·6	0·7	0·7	0·8
China . . .	*3·5*	*3·4*	*2·5*	*1·6*	*0·9*	*0·6*	*0·5*	*0·6*	*0·6*	*0·7*
Hong-Kong . .	*0·2*	*0·4*	*0·3*	*0·3*	*0·2*	*0·2*	*0·1*	*0·1*	*0·1*	*0·1*
22. Roumania . .	0·2	0·3	0·9	0·9	0·9	0·5	0·7	0·6	0·5	0·5
23. Italy . . .	1·2	0·9	0·8	0·8	0·8	0·7	0·6	0·6	0·6	1·1
24. Japan . . .	0·1	0·2	0·2	0·2	0·2	0·3	0·4	0·6	0·5	0·5
25. Portugal . .	1·2	0·9	0·8	0·7	0·7	0·6	0·6	0·5	0·4	0·4
26. Peru . . .	1·3	1·1	0·6	0·4	0·3	0·3	0·4	0·4	0·4	0·4
27. West Indies and Guiana . .	1·9	1·8	1·3	0·8	0·6	0·4	0·4	0·4	0·3	0·4

[1] The last column gives countries of consignment, 'imports' in British tables being credited to the countries from whose ports goods were directly shipped to this country. Information as to the countries from which goods were consigned or despatched to the United Kingdom was first given in the *Statistical Abstract for the United Kingdom for 1909*, but referring to the years from 1904 onwards. 'Imports' are retained in this table, however, for the sake of comparability. From the last two columns it will be seen that the countries showing the greatest difference between imports and consignments are Germany, the Netherlands, Belgium, and France.

UNITED KINGDOM

COUNTRIES OF DESTINATION OF EXPORTS OF BRITISH PRODUCE (PERCENTAGES)

To	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13
All British Possessions .	*26·8*	*33·5*	*35·0*	*34·4*	*33·1*	*34·5*	*37·8*	*33·7*	*36·4*
1. British India . . .	8·9	12·2	12·9	13·5	12·5	11·9	12·8	12·2	12·5
2. Germany	11·2	9·4	7·7	7·2	8·1	9·7	8·0	9·1	8·3
3. United States of America	13·2	9·8	11·6	12·5	11·0	7·5	7·5	7·3	6·0
4. Australia . . 18. New Zealand . .	6·7	8·9	10·3	8·3 1·3	6·8 1·4	7·4 1·8	6·3 2·1	6·1 2·1	6·9 2·2
5. France	7·1	7·5	7·2	6·2	6·3	6·3	5·4	5·7	5·5
6. Argentine Republic . .	1·3	1·0	2·0	3·2	2·2	2·4	3·1	4·7	4·3
7. British North America .	3·8	3·4	3·7	3·3	3·0	2·7	3·8	4·2	4·8
8. Cape and Natal . .	1·6	2·6	2·3	2·7	3·8	5·1	6·9	3·7	4·2
9. China and Hong-Kong .	3·7	3·8	3·5	3·5	3·2	3·3	4·0	3·5	3·4
China	—	—	—	*2·5*	*2·3*	*2·4*	*2·9*	*2·6*	*2·6*
Hong-Kong	—	—	—	*1·0*	*0·9*	*0·9*	*1·1*	*0·8*	*0·7*
10. Italy	2·8	2·8	2·9	2·9	2·5	2·6	2·8	3·3	2·9
11. Belgium	2·6	2·7	3·4	3·0	3·2	3·6	3·1	3·3	3·3
12. Netherlands . . .	6·2	4·9	4·0	3·8	3·9	3·7	3·0	3·2	3·0
13. Russia	3·3	3·2	2·3	2·1	2·7	3·7	2·9	2·9	3·1
14. Japan	0·7	1·3	1·0	1·5	1·6	2·7	2·2	2·7	2·7
15. Sweden and Norway .	1·7	1·7	1·6	1·7	2·1	2·7	2·6	2·6	2·7
16. Brazil	3·0	3·0	2·8	2·7	3·4	2·3	1·9	2·6	2·6
17. Egypt	2·3	1·2	1·3	1·3	1·6	1·9	2·4	2·3	2·0
19. Turkey	2·9	3·3	2·8	2·5	2·7	2·2	2·2	2·0	1·8
20. Chile	1·1	0·7	0·9	1·0	1·2	1·0	1·2	1·4	1·3
21. Denmark	0·9	0·9	0·9	0·9	1·2	1·4	1·3	1·3	1·2
22. Spain	1·5	1·7	1·6	1·6	1·8	1·6	1·6	1·3	—
23. Java, &c.	0·5	0·9	0·9	0·6	1·0	0·9	1·0	1·0	—
24. Austria-Hungary . .	0·5	0·4	0·4	0·4	0·6	0·7	0·7	1·0	—
25. Straits Settlements . .	0·9	1·0	1·1	1·1	0·9	1·0	1·1	1·0	—
26. British W. Indies and Gui.	1·3	1·4	1·3	1·2	1·3	1·0	0·9	0·8	—
27. Portuguese East Africa .	—	—	—	—	0·1	0·4	0·6	0·8	—
29. Nigeria	—	—	—	—	0·4	0·4	0·5	0·6	—

UNITED KINGDOM

EXPORTS OF FOREIGN AND COLONIAL ORIGIN: PERCENTAGE OF TOTAL VALUE TO DIFFERENT DESTINATIONS

To	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13
1. United States	6·9	7·8	13·2	19·8	22·5	25·2	28·5	29·7	28·2
2. Germany	18·3	18·3	18·9	18·6	18·8	18·2	16·0	16·8	17·6
All British Possessions	*8·7*	*10·1*	*11·6*	*11·5*	*10·6*	*11·1*	*12·3*	*11·5*	*12·6*
3. France	20·0	21·2	17·4	12·4	11·1	10·4	9·9	10·8	11·2
4. Russia	5·2	4·7	4·2	4·5	6·2	7·6	9·0	8·7	8·1
5. Belgium	12·1	11·7	10·2	9·7	9·1	7·5	6·2	6·7	7·0
6. Netherlands	13·0	11·0	11·0	10·6	9·2	7·0	6·9	5·4	4·7
7. Australia }	2·5	3·3	4·5	4·4	2·9	3·1	3·2	3·3	3·2
4. New Zealand }					0·7	0·7	0·8	0·8	0·8
8. British North America	1·5	1·2	1·6	1·8	1·9	2·0	2·5	2·6	3·3
9. Sweden and Norway	2·8	3·2	2·5	2·6	2·8	3·0	1·8	1·6	1·4
10. Cape and Natal	0·5	0·8	0·8	0·9	1·2	1·7	1·4	1·6	1·7
11. Italy	2·2	2·0	1·5	1·3	1·1	1·1	1·1	1·4	1·0
12. India	1·9	2·4	2·5	2·2	1·7	1·1	1·3	1·3	1·6
13. Austria-Hungary	0·7	0·5	0·6	0·7	0·7	1·0	1·0	0·9	1·2
15. Cuba and Porto Rico	0·7	1·1	1·2	1·4	1·5	0·9	1·0	0·8	0·6
16. Spain	1·4	1·2	1·5	1·1	0·8	1·1	0·9	0·7	—
17. Portugal	0·7	0·9	0·6	0·7	0·6	0·9	0·7	0·6	—
18. Denmark	0·6	0·7	0·6	0·6	0·7	0·8	0·6	0·6	—
19. Argentine Republic	0·2	0·1	0·2	0·3	0·2	0·4	0·6	0·6	—

IMPORTS AND EXPORTS AT IRISH PORTS

IMPORTS

Commodities.	Value in Million £. 1913	Value in Million £. 1919	Quantity 1913	Quantity 1919	Value in Million £. 1913	Value in Million £. 1919
I.—Farm produce, food and drink	25·9	55·2				
Wheat & flour as wheat			*14·80 mil. cwts.*	*16·97*	*6·6*	*16·3*
Maize			*14·88 ,, ,,*	*4·58*	*4·5*	*3·7*
Sugar			*2·80 ,, ,,*	*2·20*	*1·9*	*4·6*
Tea			*33·00 ,, lbs.*	*55·60*	*1·2*	*3·7*
II.—Raw Materials	11·2	24·4				
Coal, coke, &c.			*4·7 ,, tons.*	*4·3*	*3·3*	*10·3*
Flax			*41·0 thous. ,,*	*9·6*	*2·3*	*3·8*
III.—Manufactures	36·6	79·0				
Gross total	73·7	158·7[2]				

EXPORTS

Commodities.	Value in Million £. 1913	Value in Million £. 1919	Quantity or Number 1913	Quantity or Number 1919	Value in Million £. 1913	Value in Million £. 1919
I.—Farm produce, food and drink	41·1	93·7				
Cattle			*1,110 thous.*	*756*	*15·46*	*26·02*
Eggs			*6,398 thous. great hundreds*	*9,150*	*3·02*	*15·48*
Butter			*725 thous. cwts.*	*347*	*3·74*	*4·90*
II.—Raw Materials	4·5	7·0	*397 ,, ,,*	*9·9*	*1·36*	*0·10*
Raw Cotton[1]						
III.—Manufactures	28·3	75·5	*1,164 ,, ,,*	*600*	*14·11*	*31·81*
Linen piece goods			*23·4 mil. lbs.*	*14·3*	*1·73*	*3·15*
Linen yarn			*131 thous. gross tons*	—	*3·15*	*10·60*
Ships						
Gross total	73·9	176·0[3]				

[1] See par. 680.

[2] At the prices of 1904 (the first year for which such particulars of Irish trade could be obtained, when the value of the imports was £55·3 millions), £50·08 millions.

[3] At the prices of 1904 (when the value of the exports was £49·8 millions), £51·18 millions. In 1913 77 per cent. and in 1919 83 per cent. of the imports came from or through Great Britain, and in the same years 97 and 99 per cent. respectively of the exports went primarily at least to British ports.

BUNKER COAL SHIPPED AT BRITISH PORTS FOR USE IN EXTERNAL TRADE

As the amount of coal shipped at British ports to meet the requirements of shipping engaged in the external trade of the United Kingdom gives a fair indication of the volume of that trade, the figures given below showing in millions of tons and decimals of a million the amount so shipped in some recent years, including a year in which there was a great coal strike (1912) as well as years of war, will be of interest. The figures are taken from the 'Accounts relating to the Trade and Navigation of the United Kingdom' for the month of December in each year. The figures are there stated to relate to the 'foreign' trade, but the use of this term in other parts of those statements makes it clear that the trade referred to includes all except coasting trade.

Years	1901	1911	1912	1913	1916
Millions of tons . .	13·59	19·26	18·29	21·03	12·99
Years	1917	1918	1919	1920	1921
Millions of tons . .	10·23	8·76	12·00	13·84	10·93

BRITISH COMMERCE: DECLARED AND COMPUTED VALUES IN CERTAIN YEARS

The following table gives the declared values of British Imports and Exports of British Produce and Manufactures in the undermentioned years, compared with the values computed at the prices of 1873; *A*, Aggregate value of articles for which the price was separately calculated; *B*, Declared value of total trade, with the value computed on the assumption that the values of the total were affected in the same proportion as the aggregate of the articles included under *A*.[1]

Year	*A.* Imports		*A.* Exports		*B.* Imports		*B.* Exports	
	Value in Millions Sterling				Value in Millions Sterling			
	Declared	Computed	Declared	Computed	Declared	Computed	Declared	Computed
1873	308	308	172	172	371	371	255	255
1879	289	349	122	174	363	438	191½	273
1883	336	403	146	212½	427	512	240	349
1884	300	383	140	208	390	498	233	346
1885	281½	384½	131	201½	371	507	213	328
1886	263	332½	131	215	350	509	212½	349

[1] From Report by Mr. R. Giffen to the Secretary of the Board of Trade, published as a Parliamentary paper, 1888 [C.—5386]. The tables on the two following pages are from the same report.

AVERAGE PRICES OF BRITISH IMPORTS AND EXPORTS OF CERTAIN COMMODITIES IN THE UNDER-MENTIONED YEARS

I. IMPORTS

Years	Wheat	Maize	Rice	Raw Sugar	Refined Sugar	Tea	Coffee	Unmanfd. Tobacco
	per cwt. *s.*	per cwt. *s.*	per cwt. *s.*	per cwt. *s.*	per cwt. *s.*	per lb. *d.*	per cwt. £	per lb. *d.*
Extreme years 1854–1870	9·20 to 16·75	6·29 to 10·14	9·02 to 14·64	20·29 to 35·14	28·57 to 45·98	14·61 to 19·88	2·65 to 3·97	7·33 to 12·00
1871	11·84	7·69	10·19	25·10	36·15	16·44	3·15	8·09
1872	12·42	7·09	10·00	26·20	36·35	16·78	3·54	8·24
1873	13·01	7·06	9·92	23·97	33·84	16·67	4·42	7·72
1874	12·15	8·46	10·33	22·42	30·70	17·00	5·03	8·34
1875	10·61	7·95	8·95	21·16	30·33	16·73	4·73	8·63
1876	10·43	6·39	9·06	20·92	29·45	16·42	4·68	8·36
1877	12·49	6·47	10·55	25·73	33·79	15·98	4·83	8·05
1878	10·99	6·04	10·48	21·47	29·26	15·29	4·66	6·73
1879	10·56	5·43	10·15	20·22	27·39	14·68	4·40	7·20
1880	11·08	6·00	9·52	21·71	29·23	13·47	4·44	7·04
1881	11·04	6·22	8·64	21·72	28·93	12·82	3·87	6·85
1882	10·67	7·15	7·98	21·11	28·67	12·58	3·81	7·67
1883	9·81	6·53	8·20	20·10	27·22	12·46	3·51	7·63
1884	8·41	5·89	8·14	15·51	20·89	11·78	3·30	7·87
1885	7·83	5·39	7·82	13·89	18·15	12·06	3·19	7·92
1886[3]	7·55	4·91	7·48	13·07	16·70	11·77	3·27	7·23

Years	Refined Petroleum	Copper Ore	Tin	Crude Zinc	Guano	Nitrate of Soda	Window Glass	Rags	Esparto	Paper
	per gal. *d.*	per ton £	per cwt. £	per ton £	per ton £	per cwt. *s.*	per cwt. *s.*	per ton £	per ton £	per cwt. *s.*
Extreme years 1854–1870	15·82 to[1] 35·91	11·44 to 18·93	4·02 to 6·87	17·62 to 29·74	9·15 to 12·58	10·96 to 20·08	14·00 to 16·29	16·77 to[2] 20·92	4·49 to[2] 9·66	51·33 to[2] 56·15
1871	16·59	13·65	6·34	20·55	11·11	15·59	14·95	16·53	8·63	51·22
1872	16·85	17·23	6·92	20·30	10·12	15·31	17·27	16·76	7·98	56·33
1873	14·30	16·54	6·70	23·38	11·41	14·68	18·76	17·63	8·47	60·80
1874	11·10	14·91	4·91	22·21	12·00	12·00	17·45	17·06	8·42	53·09
1875	9·62	13·78	4·33	22·57	11·30	11·99	16·79	17·34	8·04	47·11
1876	13·74	12·38	3·77	22·58	11·52	11·47	15·80	16·51	8·23	48·64
1877	12·66	10·10	3·49	20·49	10·88	13·52	14·59	14·97	7·60	49·92
1878	9·70	8·65	3·13	18·64	10·16	14·88	13·71	15·19	6·93	49·51
1879	7·68	8·69	3·41	16·62	9·15	14·02	14·12	15·33	6·77	37·40
1880	8·15	9·37	4·45	18·94	10·06	15·32	14·36	15·24	7·19	36·62
1881	7·96	7·81	4·61	16·40	9·73	14·64	14·60	14·80	6·83	36·18
1882	6·92	9·73	5·23	16·93	8·64	13·27	15·73	14·31	7·09	35·29
1883	7·39	10·34	4·69	15·70	9·76	11·41	15·69	14·08	6·74	33·02
1884	7·75	11·10	4·07	14·69	9·10	9·64	13·90	13·46	6·29	30·49
1885	7·44	7·04	4·28	14·11	9·70	9·92	13·63	13·16	5·98	29·92
1886	7·04	6·85	4·81	14·32	7·31	9·94	12·58	12·45	5·51	31·21

Years	Cotton	Flax	Raw Silk	Wool	Hewn Wood	Hides, Dry and Wet
	per cwt. £	per cwt. *s.*	per lb. *s.*	per lb. *d.*	per load £	per cwt. £
Extreme years 1854–1870	2·55 to 9·79	39·04 to 60·53	13·85 to 26·56	13·65 to 18·02	2·91 to 4·35	2·52 to 4·06
1871	3·52	46·96	21·62	13·32	2·82	2·99
1872	4·24	52·28	21·43	14·51	2·91	3·42
1873	4·01	49·95	20·97	14·75	3·24	3·53
1874	3·62	48·76	16·80	14·71	3·22	3·63
1875	3·47	53·05	15·35	15·41	2·87	3·48
1876	3·02	55·29	19·18	14·54	2·90	3·13
1877	2·93	49·37	20·05	14·38	2·81	3·09
1878	2·80	48·01	17·65	13·90	2·45	2·93
1879	2·76	45·25	17·42	13·56	2·10	2·88
1880	2·94	46·13	17·04	13·66	2·47	3·12
1881	2·92	41·04	16·98	13·87	2·57	3·18
1882	2·93	38·73	16·54	12·27	2·62	3·15
1883	2·91	39·92	16·20	12·08	2·61	3·18
1884	2·85	40·73	14·79	12·09	2·39	3·19
1885	2·86	41·62	14·07	10·05	2·40	3·15
1886	2·49	41·52	13·73	9·08	2·16	2·96

[1] 1863 to 1870. [2] 1861 to 1870.
[3] For later years see the *Statistical Abstract for the United Kingdom.*

II. EXPORTS

(British Produce and Manufactures.)

Years	Alkali	Salt	Soap	Candles	Plate Glass	Coals	Pig and Puddled Iron
	per cwt.	per ton	per cwt.	per doz. lbs.	per sq. foot	per ton	per ton
	s.	s.	s.	s.	s.	s.	s.
Extreme years 1840–1870	7·58 to 11·04	8·98 to 14·94	24·71 to 33·19	7·19 to 11·87	2·04 to[1] 2·67	7·09 to 10·18	44·93 to 85·05
1871	8·37	10·47	27·14	7·78	1·95	9·63	61·08
1872	11·17	14·15	26·04	7·89	2·29	15·51	100·85[2]
1873	12·32	18·77	26·45	8·04	3·01	20·49	124·65[2]
1874	10·45	16·00	25·35	8·26	3·06	16·98	94·67
1875	9·16	14·75	24·74	8·00	2·62	13·10	72·80
1876	8·15	12·35	24·58	7·60	2·22	10·80	62·47
1877	7·73	11·10	24·45	7·73	2·22	10·05	57·34
1878	7·00	12·31	24·15	7·64	1·85	9·35	53·52
1879	6·34	11·50	22·54	6·81	1·58	8·63	51·50
1880	6·96	11·49	22·47	6·80	1·62	8·76	63·94
1881	6·14	11·64	22·48	6·52	1·52	8·83	55·38
1882	6·14	11·90	22·40	6·50	1·53	8·99	56·45
1883	6·12	12·84	22·96	6·72	1·42	9·20	52·14
1884	6·37	12·91	22·99	6·66	1·45	9·18	46·40
1885	5·87	14·59	23·50	6·14	1·27	8·83	43·56
1886	5·73	14·61	20·93	5·40	1·09	8·32	43·17

Years	Tin, Unwrought	Tinned Plates	Copper, Unwrought	Lead: Pig, Sheet, and Pipe	Cement	Cotton Yarn	Cotton piece goods Plain	Cotton piece goods Printed	Wool: Sheep and Lamb's
	per cwt.	per ton	per cwt.	per ton	per cwt.	per lb.	per yd.	per yd.	per lb.
	£	£	£	£	s.	d.	d.	d.	d.
Extreme years 1840–1870	3·04 to 6·64	23·47 to[3] 26·71	3·73 to 5·96	17·24 to 24·88	2·43 to[4] 4·12	10·44 to 28·80	2·79 to 5·79	4·01 to 6·32	11·40 to 23·89
1871	6·70	24·25	3·78	19·27	2·44	18·66	3·33	4·71	16·64
1872	7·47	32·24	4·81	20·45	2·45	18·87	3·51	4·92	19·86
1873	6·83	32·77	4·68	23·75	3·04	17·76	3·45	4·78	21·18
1874	5·24	30·21	4·40	22·63	2·98	15·79	3·22	4·69	21·92
1875	4·57	26·64	4·40	23·17	2·61	14·66	3·13	4·77	21·14
1876	3·96	21·81	4·13	22·55	2·55	13·10	2·83	4·48	18·53
1877	3·68	19·80	3·78	21·49	2·58	12·85	2·83	4·31	17·73
1878	3·32	17·60	3·49	18·74	2·56	12·47	2·76	4·18	19·87
1879	3·60	17·81	3·17	15·42	2·49	12·33	2·65	3·91	14·39
1880	4·52	20·43	3·41	17·41	2·50	13·25	2·73	3·79	16·57
1881	4·80	17·11	3·28	15·72	2·37	12·39	2·65	3·68	15·26
1882	5·24	17·51	3·57	15·45	2·34	12·96	2·71	3·73	15·20
1883	4·88	17·47	3·38	14·07	2·31	12·25	2·61	3·62	12·71
1884	4·27	16·45	2·94	12·58	2·25	12·24	2·47	3·60	10·94
1885	4·43	14·84	2·40	12·25	2·20	11·58	2·33	3·47	9·55
1886	5·03	14·16	2·19	13·85	2·02	10·84	2·21	3·18	10·07

Years	Woollen and Worsted Yarn	Woollen Cloths, &c.	Linen Manufactures: Plain	Linen Manufactures: Sails and Sailcloth	Jute Manufactures	Silk Manufactures	Boots and Shoes
	per lb.	per yd.	per yd.	per yd.	per yd.	per yd.	per doz. prs.
	d.	d.	d.	d.	d.	s.	s.
Extreme years 1840–1870	22·12 to 41·06	23·83 to 40·99	6·84 to 8·50	8·34 to 14·20	3·56 to[5] 6·16	3·14 to[5] 4·09	60·82 to[6] 75·83
1871	33·49	37·52	7·39	12·94	3·95	3·32	59·72
1872	36·91	41·19	7·43	14·29	4·22	3·15	58·54
1873	37·26	41·00	7·62	13·97	3·98	3·54	64·73
1874	38·14	39·53	7·80	14·41	3·57	3·36	67·02
1875	38·58	39·09	7·59	14·36	3·30	3·08	65·56
1876	34·36	38·25	7·14	14·37	3·09	3·29	63·35
1877	32·12	35·72	6·93	13·71	3·18	3·22	61·28
1878	30·07	34·53	7·20	12·96	3·10	3·32	61·16
1879	26·71	31·89	7·08	11·69	2·87	3·38	60·52
1880	30·33	32·34	7·38	12·15	2·95	3·26	61·03
1881	26·04	32·55	7·03	12·01	2·78	3·27	57·13
1882	25·62	34·18	6·89	12·44	2·70	3·37	58·72
1883	23·41	38·30	6·95	11·73	2·64	3·26	60·10
1884	23·78	41·42	6·62	10·95	2·43	3·26	59·92
1885	24·19	40·23	6·35	10·83	2·13	3·72	58·09
1886	23·19	39·56	5·98	11·09	2·01	3·97	58·38

[1] 1857 to 1870. [2] Export of iron, wrought and unwrought, from the United Kingdom to the United States in thousands of tons:—1869, 735; 1870, 832; 1871, 1064; 1872, 975; 1873, 493; 1874, 287 Do. to Germany:—1869, 200; 1872, 440; 1873, 396; 1874, 227.
[3] 1857 to 1870. [4] 1843 to 1870. [5] 1861 to 1870. [6] 1862 to 1870.

STATEMENT SHOWING FOR THE UNITED KINGDOM, BY THE METHOD OF INDEX NUMBERS, THE FLUCTUATION IN THE WHOLESALE PRICES OF CERTAIN PRINCIPAL ARTICLES AND A COMBINED INDEX NUMBER FOR FORTY-FIVE PRINCIPAL ARTICLES IN EACH OF THE YEARS 1871–1908. (See par 43, p. 17.)

Prices in the Year 1900 *are taken as* 100.

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Years	Coal	Raw Cotton	Raw Flax	British Wheat	Foreign Wheat	British Oats	Foreign Oats	Maize	Rice
1871	58·3	135·1	121·2	210·5	174·1	143·1	146·6	169·0	133·2
1872	93·9	162·6	135·0	211·8	182·6	131·8	139·7	155·8	130·7
1873	124·0	153·7	128·9	218·0	191·3	144·5	154·7	155·2	129·7
1874	102·8	139·0	125·9	207·1	178·7	164·0	172·6	185·9	135·0
1875	79·3	133·1	136·9	167·8	156·0	163·0	167·0	174·7	117·0
1876	65·4	115·9	142·7	171·5	153·4	149·3	158·2	140·4	118·4
1877	60·8	112·2	127·4	210·8	183·7	147·4	148·4	142·2	137·9
1878	56·6	107·3	123·9	172·4	161·6	138·4	137·0	132·7	137·0
1879	52·2	105·7	116·8	162·8	155·3	123·7	128·2	119·3	132·7
1880	53·0	112·7	119·1	164·7	162·9	131·3	137·0	131·9	124·4
1881	53·5	112·2	105·9	168·4	162·4	123·7	140·5	136·7	112·0
1882	54·4	112·3	100·0	167·5	156·9	124·2	129·6	157·1	104·3
1883	55·7	111·4	103·0	154·5	144·3	121·8	127·1	143·5	107·2
1884	55·6	109·1	105·1	132·5	123·7	115·2	124·6	129·5	106·4
1885	53·5	109·8	107·4	122·0	115·1	117·1	125·0	118·5	102·2
1886	50·4	95·5	107·2	115·2	111·0	108·1	113·1	107·9	97·8
1887	49·6	96·2	93·8	120·7	112·5	92·4	92·5	106·4	97·6
1888	50·1	99·1	87·7	118·3	112·9	95·3	94·0	119·3	97·5
1889	60·9	101·1	92·3	110·5	113·1	109·9	107·3	104·2	106·8
1890	75·0	102·3	86·7	118·6	114·7	105·7	117·9	99·8	111·9
1891	72·4	99·1	90·4	137·5	130·6	113·7	126·5	137·8	118·0
1892	65·9	91·6	88·6	112·4	112·6	112·8	122·8	117·1	116·2
1893	59·1	93·0	96·2	97·8	94·7	106·6	118·2	105·5	102·6
1894	63·0	79·1	95·7	84·8	78·7	97·2	100·0	98·9	99·6
1895	55·8	74·4	88·1	85·8	81·0	82·5	92·1	101·1	95·4
1896	52·8	88·7	94·3	97·2	91·0	83·9	92·3	80·0	97·4
1897	53·4	80·1	91·9	112·1	109·6	96·2	96·2	75·2	106·8
1898	59·3	68·9	83·6	126·3	117·9	104·7	108·1	86·8	115·3
1899	63·7	73·0	83·3	95·7	98·4	96·7	103·3	91·0	113·9
1900	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
1901	83·1	98·6	117·2	99·4	97·4	104·7	108·4	105·9	95·8
1902	73·8	97·3	115·5	104·3	98·4	114·7	122·1	115·8	83·7
1903	70·1	107·3	108·0	99·4	99·9	97·6	100·6	109·5	97·0
1904	66·7	119·9	118·1	105·3	103·1	92·9	101·5	105·0	87·2
1905	63·4	101·5	111·5	110·5	106·3	99·1	105·8	115·2	90·3
1906	65·5	119·2	117·6	105·3	103·4	105·7	113·8	108·1	92·3
1907	76·5	126·8	107·2	113·6	113·1	107·6	123·8	120·2	106·8
1908	76·5	116·1	99·6	118·9	123·5	101·4	119·9	135·0	99·1

STATEMENT SHOWING FOR THE UNITED KINGDOM, BY THE METHOD OF INDEX NUMBERS, THE FLUCTUATIONS IN THE WHOLESALE PRICES OF CERTAIN PRINCIPAL ARTICLES AND A COMBINED INDEX NUMBER FOR FORTY-FIVE PRINCIPAL ARTICLES IN EACH OF THE YEARS 1871–1908.

Prices in the Year 1900 *are taken as* 100.

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Year	Potatoes	Beef	Bacon	Tea	Petroleum	Hewn Fir	Hides	Caoutchouc	General Index Number for Forty-five Articles
1871	163·9	111·2	117·9	192·5	313·8	159·1	121·1	76·9	136·0
1872	182·5	114·7	98·2	196·5	310·9	163·0	138·5	82·4	145·8
1873	193·8	126·7	97·9	195·2	273·2	176·6	142·9	81·5	152·7
1874	179·4	123·3	109·6	199·1	212·4	179·9	147·0	75·5	148·1
1875	173·2	127·6	125·3	195·9	183·0	157·1	140·9	75·2	141·4
1876	191·8	124·1	128·0	192·3	260·6	159·1	126·7	71·1	138·0
1877	197·9	122·4	114·7	187·1	240·7	155·2	125·1	68·3	141·6
1878	185·6	124·1	92·5	179·0	183·9	135·7	118·6	64·4	132·6
1879	203·9	113·8	82·3	171·9	146·7	118·2	116·6	79·4	126·6
1880	194·8	122·4	95·9	157·7	154·9	134·4	126·3	103·5	129·6
1881	179·0	113·8	109·9	150·1	151·2	135·7	128·7	96·3	127·3
1882	169·9	124·1	127·1	147·3	132·3	139·0	127·5	114·4	128·4
1883	181·9	125·9	127·2	145·9	141·3	134·4	128·7	117·1	126·8
1884	147·4	119·0	118·0	137·9	148·2	119·5	129·1	84·0	114·7
1885	146·4	108·6	97·1	141·2	142·3	116·2	127·5	80·8	107·7
1886	141·4	100·0	90·4	137·8	134·6	102·6	119·8	83·8	101·6
1887	147·6	91·4	101·1	123·9	124·7	96·8	110·1	83·7	99·6
1888	136·1	101·7	107·3	128·7	124·7	103·2	104·5	85·2	102·7
1889	136·1	100·0	99·7	126·3	115·5	114·9	101·6	81·4	104·0
1890	125·4	100·0	88·2	124·7	104·8	105·8	98·0	90·9	104·0
1891	160·0	101·7	90·8	125·3	94·3	97·4	98·0	88·3	107·4
1892	134·0	98·3	97·9	117·9	86·2	97·4	92·7	80·5	101·8
1893	131·1	98·3	127·0	114·1	75·3	90·9	93·5	83·4	100·0
1894	136·5	93·1	105·0	112·3	70·0	87·0	87·9	79·5	94·2
1895	146·2	93·1	93·5	112·8	87·2	88·3	89·9	80·9	91·0
1896	104·1	91·4	82·7	111·8	90·2	92·2	92·3	85·1	88·2
1897	107·4	93·1	84·9	109·6	82·4	93·5	93·1	84·3	90·1
1898	136·9	87·9	86·6	106·9	78·2	95·5	95·1	93·2	93·2
1899	111·3	94·8	85·8	103·3	87·4	94·2	93·1	96·8	92·3
1900	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
1901	109·3	94·8	112·8	89·8	91·8	94·8	100·8	91·8	96·9
1902	94·8	101·7	126·4	84·3	83·7	89·0	104·5	90·8	96·5
1903	109·8	96·6	126·5	90·3	85·1	90·9	108·5	101·9	96·9
1904	124·7	94·8	112·8	84·8	88·7	85·7	106·9	114·0	98·3
1905	104·1	94·8	111·3	84·8	83·0	87·7	113·0	119·4	97·6
1906	101·0	94·8	126·6	86·7	89·7	89·6	123·1	102·7	100·5
1907	105·2	96·6	132·5	95·2	91·6	92·2	132·0	119·3	105·7
1908	113·4	98·3	122·0	93·2	88·9	87·7	119·0	107·0	102·8

AVERAGE PRICES IN POUNDS STERLING PER TON

The following table, based for the most part on the import and export returns of the United Kingdom, is designed to show the value of a variety of commodities for the same unit of quantity in order that one may have an idea of the proportion of the addition to the total cost made by transport costs, in so far as these depend on quantity. Except where Exp. is printed in the third column, or Ger. exp. inserted in parenthesis, the prices are import prices. Ger. exp. signifies that where the British returns do not enable us to give values in the terms required German export prices have been taken instead. As the figures are intended only for rough comparisons the prices are not entered with the same precision where the prices are high as where they are low.

	1912	1919	
Apparel and drapery, various (Ger. exp.)	557·0	—	
Bananas[1]	3·7	9·6	
Bricks	0·8[2]	4·9[3]	Exp.
Butter	121·6	254·0	
Cacos, raw	58·0	81·2	
„ prepared	152·0	228·0	
Cement	1·6	5·3	Exp.
Cheese	64·2	143·2	
Chemicals—			
Aniline and naphthalene dye-stuffs	109·0[4]	608·0	Exp.
Caustic soda	9·7	24·3	Exp.
Coal	0·63	2·4	Exp.
Coffee	75·0	112·0	
Copra	29·0	52·8	
Cotton—			
Raw	92·3	218·0	
Yarn	111·0	325·0	
Sewing thread	388·0	1066·0	Exp.
Tissues, bleached (Ger. Exp.)	213·0	—	
Hosiery (Ger. Exp.)	415·0	—	
Cutch and gambier	28·1	55·4	
Feathers, ornamental	3645·0	3267·0	
Fish—herrings	9·6	26·9	Exp.
Flax	49·9	263·0	
Fruit, apples	12·9	42·1	
„ currants	25·8	71·3	
Glass, window	11·5	63·6[5]	
Grain—			
Wheat	8·5	19·2	
Rice	11·3	29·5	
Wheat meal and flour	10·8	29·0	
Hemp	25·5	72·5	
Hides, dry	74·1	169·0	
Ice	0·5[4]	2·8	
Iron, pig and puddled	4·5	12·6	
Rails	6·61	32·4	
Ship plates	7·5	—	
Tinned plates	14·2	38·3	
Iron ore, non-manganiferous	0·8	2·2	
Jute—raw	21·7	56·6	
Yarn	38·3	185·0	
Lard	51·1	171·0	
Leather—			
Undressed	113·3	—	
Dressed (excl. varnished or enamelled)	352·0	—	

	1912	1919	
Linseed	12·2	37·4	
Linen yarn	91·2	468·0	
Machinery[6]	35·0	—	
„ textile	44·0	—	Exp.
Manures—			
Guano	5·8	12·4	
Basic slag	1·5	6·3	Exp.
Nitrate of soda	10·3	21·0	
Sulphate of ammonia	14·0	24·0	Exp.
Margarine	52·0	97·1	
Meat—bacon	62 8	177·7	
Mutton, frozen	40·5[4]	88·0	
Metals—			
Copper regulus	38·9	72·1	
Lead, pig and sheet	17·4	32·3	
Tin	208·0	200·0	
Oil—			
Coco-nut, refined	44·1	107·3	
Olive, refined	60·3[7]	182·3	
Palm, refined	41·1	72·0	
Paper materials—			
Linen and cotton rags	10·7	28·9	
Wood pulp	4·8	16·4	
Pepper	60·8	121·4	
Petroleum—			
Lubricating	1·1[8]	3·6	
Illuminating	3·6	—	
Potatoes	6·0	31·3	
Rosin	15·2	42·9	
Rubber	392·0	234·0	
Salt	0·83	3·5	Exp.
Slates, roofing	3·5	8·7	
Sugar, refined	16·5	41·6	
Tea	81·4	150·0	
Tobacco—			
Unmanufactured	83·7	245·0	
Cigars	1529·0	—	
Cigarettes	866·0	—	
Turpentine	31·3	85·1	
Valonia	10·6	25·3	
Wood[9]			
Pit props	1·5	4·2	
Oak, hewn	5·4	19·2[3]	
Teak, „	13·5	42·8[3]	
Wool—			
Sheep or lamb's	92·3	208·0	
Tops	174·0	485·0	Exp.
Woollen and worsted yarn	232·0	818·0	Exp.
Woollen cloths and stuffs (Ger. Exp.)	418·0	—	

[1] At 12 bunches to the ton.

[2] For 1912 at 250 bricks to the ton; for 1920 entered by quantity in the original returns, but inclusive of tiles and bricks. [3] 1920. [4] 1913.

[5] Window and German sheet glass, including shades and cylinders.

[6] The value here given for machinery is the approximate average value at the factory of all machinery, not electrical, returned at the United Kingdom Census of Production, 1907, both by quantity and value. See *Report*, Pt. II, p. 12. The corresponding value of textile machinery is approximately £33 per ton, that of exported textile machinery about £44. *Ibid.* p. 13.

[7] Per tun, which, in the case of olive oil, seems to be officially taken as equivalent to a ton.

[8] At 35 gallons to the ton.

[9] For all classes of wood the ton taken at 40 cubic feet, a load being taken at 50 cubic feet.

COMPARISON OF AVERAGE IMPORT AND EXPORT PRICES IN THE TRADE OF THE UNITED KINGDOM, 1912

	Imp.		Exp.	
Boots and Shoes of leather	3·60	£ per doz. pairs	2·85	Boots and shoes of leather
,, ,, ,, rubber	1·23	,, ,,	1·04	,, ,, ,, rubber
Cement	1·34	*s.* ,, cwt.	1·58	Cement
Chemicals—				Chemicals—
Bleaching materials and soda compounds	11·69	,, ,,	4·36	Bleaching Powder
		,, ,,	3·94	Soda Ash
		,, ,,	9·68	,, Caustic
		,, ,,	3·52	,, Crystals
		,, ,,	1·75	,, Sulphate
		,, ,,	24·24	,, Chromate and Bichromate
China and Earthenware	29·92	,, ,,	—	China and Earthenware
Copper—				Copper—
Regulus and precipitate	38·94	£ ,, ton	37·60	Regulus and precipitate
Unwrought and part wrought	72·16	,, ,,	77·00	Unwrought and partwrought
Cotton, yarn	11·86	*d.* ,, lb.	15·28	Cotton, yarn
,, piece goods	6·60	,, yd.	3·41	,, piece goods
Dyes from coal tar	4·87	£ ,, cwt.	3·67	Dyes from coal tar
Glass, window	11·46	*s.* per cwt.	—	Glass, window
,, flint	29·87	,, ,,	68·24	,, flint
,, plate	24·78	,, ,,	33·98	,, plate
,, bottles	8·71	,, gross	12·48	,, bottles
Gloves	23·63	,, doz. pairs	31·17	Gloves
Glue	2·03	£ ,, cwt.	0·95	Glue
Hats, straw	21·47	*s.* ,, doz.	21·95	Hats, straw
,, felt	30·78	,,	35·81	,, felt
Iron and steel and manufrs. thereof				Iron and steel and manufrs. thereof
,, ,, ingots, blooms, &c.	4·80	£ ,, ton	11·59	,, ,, ingots, blooms, &c.
,, girders, beams, joists, pillars	5·80	,, ,,	8·08	,, girders, beams, joists, pillars
Jute, yarn	4·10	*d.* ,, lb.	3·86	Jute, yarn
,, piece goods	—	,, yd.	3·62	,, piece goods
Leather, undressed	5·66	£ ,, cwt.	8·53	Leather, undressed
,, dressed	17·77	,, ,,	25·96	,, dressed
Linen, yarn	9·77	*d.* ,, lb.	17·22	Linen, yarn
,, piece goods		,, yd.	6·88	,, piece goods
Motor cars	247·75	£ each	383·50	Motor cars
Oilcloth	16·42	*d.* per sq. yd.	12·09	Oilcloth
Paper, unprinted	12·77	*s.* ,, cwt.	22·61	Paper unprinted
Wool—				Wool—
Woollen and worsted yarn	24·89	*d.* ,, lb.	22·46	Woollen and worsted yarn
Woollen cloths	37·58	,, yd.	64·8 to 11·18	Woollen tissues

INDIA[1]

GENERAL IMPORTS, BY SEA, OF PRIVATE MERCHANDISE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1870–75	'75–80	'80–86	'86–91	'91–96	'96–01	1901–06	'06–11	'11–14	'70–75	'75–80	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14
1. Cotton manufactures	17·07	16·23	20·14	21·24	17·55	18·51	23·31	28·16	39·26	56·5	50·2	48·9	45·9	42·4	40·0	39·3	34·8	36·6
Tissues	*14·41*	*13·85*	*17·40*	*18·68*	*15·71*	*16·66*	*21·58*	*25·89*	*36·51*	*47·7*	*42·9*	*42·4*	*40·4*	*38·0*	*36·0*	*36·4*	*32·0*	*34·0*
Yarns	*2·66*	*2·38*	*2·74*	*2·56*	*1·84*	*1·85*	*1·73*	*2·27*	*2·76*	*8·8*	*7·3*	*6·6*	*5·5*	*4·4*	*4·0*	*2·9*	*2·8*	*2·6*
2. Metals	2·11[2]	2·93	3·58	3·64	3·53	3·62	5·67	8·47	11·51	6·9	9·1	8·8	7·9	8·5	7·8	9·6	10·5	10·7
Iron and steel	*0·91*	*1·28*	*1·59*	*1·91*	*1·85*	*2·47*	*3·83*	*5·95*	*8·35*	*3·0*	*4·0*	*3·9*	*4·1*	*4·5*	*5·3*	*6·5*	*7·4*	*7·8*
Copper	—	*1·20*	*1·53*	*1·23*	*1·20*	*0·65*	*1·17*	*1·67*	—	—	*3·7*	*3·7*	*2·7*	*2·9*	*1·4*	*2·0*	*2·1*	—
3. Sugar	0·52	0·79	1·17	1·67	1·69	2·73	4·20	7·14	9·15	1·7	2·5	2·8	3·6	4·1	5·9	7·1	8·8	8·5
4. Machinery and millwork	0·67	0·80	1·02	1·42	1·52	1·84	2·42	3·85	3·94	2·2	2·4	2·5	3·1	3·7	4·0	4·1	4·8	3·7
5. Railway materials	0·62	0·73	1·15	1·47	0·83	1·59	1·01	3·80	4·64	2·0	2·3	2·8	3·2	2·0	3·4	1·7	4·7	4·3
6. Oil, chiefly mineral	0·07	0·23	0·67	1·47	1·76	2·38	2·33	2·34	2·85	0·2	0·7	1·6	3·2	4·2	5·1	3·9	2·9	2·7
7. Hardware and implements	—	0·38	0·59	0·77	0·80	1·02	1·42	2·09	2·33	—	1·2	1·4	1·7	1·9	2·2	2·4	2·6	—
8. Provisions	—	0·73	0·86	1·05	1·07	1·10	1·39	1·85	1·50	—	2·3	2·1	2·3	2·6	2·4	2·3	2·3	1·4
9. Woollens	0·57	0·73	0·98	1·16	0·99	1·07	1·47	1·71	2·29	1·9	2·3	2·4	2·5	2·4	2·3	2·5	2·1	2·1
10. Apparel	0·51	0·47	0·65	0·90	0·89	0·92	1·32	1·68	1·08	1·7	1·5	1·6	1·9	2·2	2·0	2·2	2·1	1·0
11. Silks	0·52	0·66	0·99	1·13	1·02	0·87	1·20	1·50	1·96	1·7	2·1	2·4	2·5	2·4	1·9	2·0	1·9	1·8
Coal and coke	0·54	0·79	0·94	1·10	0·75	0·43	0·26	0·43	0·61	1·8	2·5	2·3	2·4	1·8	0·9	0·4	0·5	0·6
Average total value	30·21	32·20	41·06	46·20	41·46	46·24	59·32	80·80	107·29									

EXPORTS,[3] BY SEA, OF PRIVATE MERCHANDISE

Principal Articles.	1870–75	'75–80	'80–86	'86–91	'91–96	'96–01	1901–06	'06–11	'11–14	'70–75	'75–80	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14
1. Grain and pulse	5·15	7·54	12·68	12·27	12·69	11·38	19·60	19·98	34·87	9·6	14·2	19·0	17·9	18·9	17·0	20·7	16·9	22·2
Rice and paddy	*4·65*	*6·03*	*6·82*	*7·05*	*7·69*	*8·56*	*12·02*	*12·83*	*19·60*	*8·7*	*11·3*	*10·2*	*10·3*	*11·7*	*12·8*	*12·7*	*10·8*	*12·5*
Wheat	*0·34*	*1·27*	*5·57*	*4·79*	*4·28*	*2·09*	*6·04*	*5·71*	*9·80*	*0·6*	*2·3*	*8·4*	*7·0*	*6·2*	*3·1*	*6·4*	*4·8*	*6·2*
2. Raw cotton	15·66	9·19	11·18	11·16	7·23	6·87	12·31	17·99	21·95	29·2	17·1	16·7	16·3	11·0	10·3	13·0	15·2	14·0
3. Raw jute	3·30	2·92	3·83	5·00	5·25	6·02	8·50	12·70	17·87	6·1	5·4	5·7	7·3	8·1	9·1	9·0	10·7	11·4
4. Oil-seeds	2·51	4·74	6·77	6·87	7·82	6·19	9·49	11·38	16·99	4·6	8·8	10·2	10·0	11·9	9·3	10·0	9·6	10·8
5. Jute manufactures	0·22	0·73	1·04	1·53	2·16	4·04	6·61	11·18	14·92	0·4	1·4	1·6	2·2	3·3	6·1	7·0	9·5	9·5
6. Hides and skins	2·40	2·83	3·64	3·43	3·69	5·83	6·57	8·73	10·28	4·4	5·3	5·5	5·0	5·7	8·7	6·9	7·4	6·5
7. Tea	1·49	2·41	3·12	3·80	4·31	5·57	5·52	7·29	9·16	2·8	4·5	4·7	5·5	6·6	8·4	5·8	6·2	5·8
8. Opium	11·07	10·80	9·51	7·28	5·39	5·05	6·28	6·59	6·16	20·7	20·2	14·2	10·6	8·2	7·6	6·6	5·6	3·9
9. Cotton twist and yarn	0·15	0·61	1·60	3·63	3·68	4·11	6·52	6·32	6·08	0·3	1·2	2·4	5·3	5·6	6·2	6·9	5·3	3·9
10. Cottons	1·21	1·31	1·67	1·96	1·94	0·86	1·13	1·34	1·50	2·3	2·5	2·5	2·9	3·0	1·3	1·2	1·1	1·0
11. Lac and lac dyes	0·22	0·40	0·50	0·39	0·68	0·72	1·57	2·04	1·35	0·4	0·7	0·8	0·6	1·1	1·1	1·7	1·7	0·9
12. Raw wool	0·82	0·94	0·86	1·11	1·10	0·79	0·98	1·64	1·72	1·5	1·8	1·3	1·6	1·7	1·2	1·0	1·4	1·1
14. Coffee	1·15	1·29	1·16	1·13	1·28	0·98	0·98	0·79	0·99	2·2	2·4	1·7	1·7	1·9	1·5	1·0	0·7	0·6
28. Indigo	3·10	2·61	3·35	2·63	2·59	1·96	0·74	0·34	0·18	5·7	4·8	5·0	3·8	4·0	3·0	0·8	0·3	0·1
Average total value	53·57	53·40	66·64	68·50	65·90	66·61	94·54	118·27	157·19									

[1] Year ends March 31st.

[2] Including 'hardware and implements.'

[3] General exports to 1896, special exports from 1896–7 onwards.

INDIA

COUNTRIES[1] OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–76	'76–81	'81–86	'86–91	'91–96	'96–01	'01–06	'07–11	'11–14
1. United Kingdom .	83·6	81·6	80·8	77·6	70·8	67·7	65·6	63·3	63·3
2. Germany . .	0·1	0·1	0·2	0·9	2·6	3·0	3·6	6·0	6·6
3. Java . . .	—	—	—	—	0·2	0·3	1·3	5·8	6·2
4. United States .	0·4	0·9	1·5	2·0	1·9	1·9	1·7	2·8	3·2
5. Straits Settlements	2·4	2·9	3·2	3·3	3·3	2·9	2·9	2·4	2·0
6. Austria-Hungary .	0·3	0·3	0·7	1·2	1·7	3·2	3·8	2·3	2·2
7. Mauritius . .	1·5	2·1	2·1	2·5	2·5	2·7	2·4	2·1	1·6
8. Japan . . .	—	—	—	—	0·3	0·8	1·2	2·1	2·6
9. China & Hong-Kong	4·3	3·7	3·7	3·5	4·3	2·7	2·2	1·8	1·7
China . . .	—	*0·5*	*0·5*	*0·6*	*1·2*	*0·9*	*0·8*	*1·0*	*1·1*
Hong-Kong . .	—	*3·2*	*3·2*	*2·9*	*3·1*	*1·8*	*1·4*	*0·8*	*0·6*
10. Belgium . .	—	—	0·3	0·9	2·8	3·1	3·9	1·7	2·0
11. France . .	1·1	1·2	1·2	1·3	1·5	1·4	1·8	1·6	1·5
12. Italy . .	0·7	1·0	0·9	0·7	0·6	0·9	1·2	0·9	1·0
13. Netherlands . .	—	—	—	—	0·3	0·5	0·7	0·8	0·9
14. Australia . .	0·6	0·5	0·8	0·6	0·4	0·7	0·8	0·8	0·6
Average total value in millions sterling .	30·75	33·90	39·92	46·20	41·46	46·24	59·32	82·95	107·3

To	'71–76	'76–81	'81–86	'86–91	'91–96	'96–01	'01–06	'07–11	'11–14
1 United Kingdom .	50·6	43·2	41·7	37·3	31·7	30·1	26·0	25·3	24·8
2. Germany . .	0·3	0·4	0·7	2·2	6·4	7·5	8·9	10·2	10·4
3. China & Hong-Kong	21·1	21·2	15·5	14·4	12·2	12·2	12·8	9·7	7·3
Hong-Kong . .	—	*16·1*	*11·5*	*10·9*	*7·6*	*7·6*	*7·6*	*5·1*	*3·6*
China . . .	—	*5·1*	*4·0*	*3·5*	*4·6*	*4·7*	*5·2*	*4·6*	*3·8*
4. United States .	3·5	3·5	3·7	3·8	4·3	5·8	6·7	7·6	7·9
5. France . .	6·6	8·1	9·1	8·1	8·8	6·1	6·5	6·5	6·7
6. Japan . . .	—	0·1	0·3	1·0	1·6	4·1	5·6	5·8	8·2
7. Belgium . .	0·1	0·3	3·4	4·5	4·3	3·4	4·4	4·9	5·4
8. Ceylon . .	2·8	3·5	2·0	2·3	3·0	3·9	3·4	3·7	3·7
9. Straits Settlements	3·7	4·1	4·1	4·9	4·9	5·4	4·8	3·6	3·4
10. Austria-Hungary .	2·0	2·5	2·8	3·0	2·5	2·1	2·7	3·5	3·5
11. Italy . . .	2·0	3·0	4·1	4·4	3·0	2·8	2·8	3·4	3·0
12. Australasia . .	0·3	0·7	0·9	1·1	1·0	1·4	1·3	1·7	1·7
Egypt . . .	0·1	1·1	3·2	3·7	4·7	4·8	—	1·0[2]	0·8
Average total value in millions sterling .	53·64	55·38	67·55	68·50	65·90	68·89	96·73	121·4	157·2

TOTAL TRADE

	'70–75	'75–80	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14
Imports.									
Private merchandise.	30·21	32·20	41·06	46·20	41·46	46·24	59·32	80·80	107·29
Government stores .	1·42	1·49	2·14	2·03	2·00	2·81	5·18	4·40	4·26
Treasure . .	6·69	9·02	10·20	11·23	8·95	12·66	20·76	24·92	35·28
Total . .	38·31	42·70	53·40	59·46	52·41	61·71	85·25	110·11	146·83
Exports.									
Indian produce .	51·94	51·64	64·35	65·57	63·09	66·61	94·54	118·27	157·19
Re-exports . .	1·64	1·76	2·29	2·93	2·81	2·28	2·19	2·41	3·43
Government stores .	0·02	0·04	0·05	0·05	0·05	0·09	0·25	0·07	0·09
Treasure . .	1·60	2·46	1·03	1·31	3·19	5·46	9·07	4·13	6·24
Total . .	55·20	55·91	67·73	69·86	69·15	74·44	106·06	124·88	166·96

The rupee has been converted at the average rate of exchange on London, namely :

Year	'70–71	'71–72	'72–73	'73–74	'74–75	'75–76	'76–77	'77–78	'78–79	'79–80
Pence	22·5	23·1	22·7	22·3	22·1	21·6	20·5	20·8	19·8	20·0
Year	'80–81	'81–82	'82–83	'83–84	'84–85	'85–86	'86–87	'87–88	'88–89	'89–90
Pence	20·0	19·9	19·5	19·5	19·3	18·2	17·44	16·9	16·4	16·5
Year	'90–91	'91–92	'92–93	'93–94	'94–95	'95–96	'96–97	'97–98	'98–99	
Pence	18·5	16·75	15·0	14·5	13·0	13·5	14·5	15·5	16·0	

From 1898–9 till the war the average exchange was steady at 16·0.

[1] Countries of consignment from 1907–8.

[2] The sudden change in the relative importance of Egypt among the destinations of Indian goods is due to the fact that goods sent to Port Said, largely to await orders, down to 1902–3 inclusive, were all credited to Egypt, while from 1903–4 onwards the ultimate destination was given when that could be ascertained.

CEYLON

GENERAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'06–10	'11–13	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13
1. Rice and paddy	1·81	1·75	2·49	2·92	3·30	34·4	38·3	32·8	32·2	27·2
2. Coal and coke	0·19	0·37	0·73	0·83	0·94	3·7	8·2	9·6	9·1	7·8
3. Specie and bullion	0·96	0·48	0·71	0·66	0·64	18·2	10·6	9·4	7·3	5·3
4. Cottons	0·81	0·32	0·44	0·58	0·84	15·5	7·0	5·7	6·4	6·9
5. Manures	—	0·03	0·12	0·27	0·48	—	0·6	1·6	2·9	4·0
6. Sugar	—	0·10	0·15	0·21	0·33	—	2·2	1·9	2·4	2·7
7. Grain and flour, ex. rice	0·09	0·12	0·16	0·21	0·30	1·7	2·6	2·1	2·3	2·4
8. Cutlery and hardware	0·04	0·03	0·07	0·14	0·23	0·8	0·6	0·9	1·5	1·9
9. Tea chests	—	0·01	0·10	0·13	0·17	—	0·2	1·3	1·4	1·4
10. Curry stuffs	0·04	0·06	0·11	0·12	0·14	0·9	1·3	1·4	1·3	1·2
Average total value	5·25	4·56	7·60	9·07	12·13					

Principal Countries.[2]	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13
1. India	61·4	66·0	56·4	51·2	47·9
2. United Kingdom	28·2	25·9	25·9	25·3	28·0
3. Straits Settlements	—	0·5	1·0	5·6	5·0
4. Australasia	3·0	0·6	3·7	3·4	2·6
5. Germany	—	0·6	1·9	2·4	3·1
6. Maldive Islands	0·7	1·0	1·6	1·6	1·2
7. Japan	—	0·3	1·2	1·2	1·8
8. Hong-Kong	0·4	1·0	0·8	1·2	1·1
9. United States	—	0·2	0·6	0·9	1·2
10. Austria-Hungary	—	0·2	0·8	0·9	0·5
12. Java	—	—	0·1	0·7	1·6

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'06–10	'11–13	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13
1. Tea	0·001	2·42	3·69	4·93	5·70	0·01	58·1	54·8	53·9	41·7
2. Coconut-oil	0·21	0·39	0·64	0·85	0·90	4·7	9·4	9·4	9·3	6·6
3. Plumbago	0·10	0·20	0·53	0·60	0·53	2·2	4·8	7·9	6·6	3·9
4. Copra	—	0·06	0·39	0·56	0·98	—	1·5	5·8	6·1	7·2
5. Rubber	—	—	0·01	0·53	3·57	—	—	0·2	5·8	26·1
6. Desiccated coconut	—	0·05	0·20	0·30	0·48	—	1·3	2·9	3·2	3·5
7. Cacao	—	0·09	0·16	0·20	0·18	—	2·1	2·4	2·2	1·3
8. Cinnamon	0·06	0·08	0·16	0·18	0·16	1·4	1·8	2·4	2·0	1·2
9. Coir and manufactures	—	0·07	0·13	0·17	0·20	—	1·7	1·9	1·9	1·5
10. Areca-nuts	0·08	0·06	0·10	0·16	0·18	1·8	1·5	1·4	1·7	1·3
11. Citronella-oil	—	0·04	0·06	0·08	0·09	—	1·0	0·8	0·9	0·6
12. Poonac	—	0·04	0·08	0·07	0·06	—	1·0	1·2	0·8	0·4
18. Coffee	3·16	0·27	0·03	0·01	—	71·7	6·5	0·5	0·1	—
Average total value	4·40	4·16	6·73	9·14	13·69					

Principal Countries.[2]	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13
1. United Kingdom	70·6	70·7	52·2	48·8	47·2
2. United States	2·9	6·0	8·0	10·9	15·9
3. Australasia	1·1	5·8	8·1	7·6	6·1
4. Germany	—	2·9	6·8	7·3	8·5
5. Russia	—	0·3	4·8	7·1	5·8
6. India	16·3	9·1	8·2	5·2	3·9
7. Belgium	—	0·7	2·3	2·6	3·9
8. Canada, from 1894	—	—	2·0	2·3	1·9
9. China	—	0·1	1·3	2·0	1·5
10. Austria-Hungary	3·9	1·1	1·5	1·8	0·7

[1] Government stores are included with ordinary merchandise after 1904. The entry of the values of military stores on the bills of lading was discontinued in 1902.
[2] 'Countries of Production' after 1900; 'Countries whence imported' in earlier years.

STRAITS SETTLEMENTS

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentages of Total Value.			
	'91–95	'01–05	'06–10	'11–13	'91–95	'01–05	'06–10	'11–13
1. Tin and Ore	3·01	6·82	8·49	11·56	14·3	21·1	21·6	22·4
2. Rice	2·25	3·04	4·08	6·74	10·7	9·4	10·4	13·1
3. Bullion and specie	2·42	3·18	2·31	2·50	11·5	9·8	5·9	4·9
4. Cottons	1·37	1·97	2·29	3·03	6·6	6·1	5·8	5·8
5. Opium	1·10	1·33	1·32	1·12	5·3	4·1	3·4	2·2
6. Copra	0·35	0·61	1·16	1·87	1·7	1·9	2·9	3·6
7. Rubber	—	0·19	1·03	1·59	—	0·6	2·6	3·1
8. Fish, dried, &c.	0·56	0·70	0·99	1·28	2·7	2·2	2·5	2·5
9. Pepper	0·61	0·88	0·88	0·89	2·9	2·7	2·2	1·7
10. Coal and coke	0·42	0·63	0·83	1·04	2·0	1·9	2·1	2·0
Average total value	20·96	32·34	39·30	51·63				

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	'91–95	'01–05	'06–10	'11–13	'91–95	'01–05	'06–10	'11–13
1. Tin	3·38	6·81	9·08	12·14	18·0	24·8	26·0	28·2
2. Rice	1·76	2·72	4·00	5·14	9·4	9·9	11·5	12·0
3. Bullion and specie	2·57	3·23	2·20	1·87	13·7	11·8	6·3	4·3
4. Cottons	0·85	1·07	1·42	1·38	4·5	3·9	4·1	3·2
5. Rubber[1]	0·09	0·25	1·35	*3·04*	0·5	0·9	3·9	*7·1*
6. Copra	0·43	0·64	1·22	2·00	2·3	2·3	3·5	4·7
7. Opium	0·95	1·15	1·07	1·04	5·1	4·2	3·1	2·4
8. Pepper	0·76	1·02	0·97	0·96	4·1	3·7	2·8	2·2
9. Fish, dried, &c.	0·54	0·62	0·94	1·07	2·9	2·3	2·7	2·5
10. Gambier	0·79	0·74	0·60	0·47	4·2	2·7	1·7	1·1
Average total value	18·78	27·46	34·89	43·01				

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'91–95	'01–05	'06–10	'11–13	To	'91–95	'01–05	'06–10	'11–13
1. Malay States	13·7	20·5	21·3	20·7	United Kingdom	18·9	20·0	24·8	23·8
2. Dutch Poss.	14·9	14·4	15·0	14·9	Dutch Poss.	22·3	16·6	14·8	13·7
3. India	15·3	18·1	12·4	13·0	Malay States	9·2	10·8	13·8	14·9
4. Utd. Kingdom	13·9	9·9	11·6	10·6	United States	6·7	12·4	9·7	11·7
5. Siam	7·7	8·0	10·0	9·1	India	6·0	6·9	5·8	6·3
6. Hong-Kong	10·2	10·7	8·9	8·8	Siam	6·2	5·7	5·5	3·4

MAURITIUS

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousand Pounds.				Percentages of Total Value.			
	'71–75	'01–05	'06–10	'11–13	'71–75	'01–05	'06–10	'11–13
1. Rice	401	467	500	541	18·0	21·3	23·6	22·5
2. Other grain and flour	168	174	150	174	7·5	7·9	7·1	7·2
3. Coal	33	134	133	165	1·5	6·1	6·3	6·8
4. Specie	238	84	122	21	10·7	3·8	5·8	0·9
5. Cottons	184	92	93	87	8·2	4·2	4·4	3·6
6. Sulphate of ammonia	—	57	70	108	—	2·6	3·3	4·5
7. Bags	—	47	67	69	—	2·1	3·1	2·9
8. Machinery, millwork	45	106	66	98	2·0	4·8	3·1	4·1
9. Hardware, cutlery	58	60	61	117	2·6	2·7	2·9	4·9
Average total value	2,229	2,196	2,120	2,404				

GENERAL EXPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	'71–75	'01–05	'06–10	'11–13	'71–75	'01–05	'06–10	'11–13
1. Sugar	2,403	2,115	2,259	2,325	84·2	88·5	90·6	92·8
2. Specie	153	118	80	43	5·4	4·9	3·2	1·7
3. Aloe fibre	—	39	45	48	—	1·6	1·8	1·9
Average total value	2,852	2,724	2,492	2,506				

COUNTRIES[3] OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–75	'01–05	'07–10	'11–13	To	'71–75	'01–05	'07–10	'11–13
1. India	30·6	43·6	43·9	38·3	India	19·2	59·1	62·6	57·0
2. Utd. Kingdom	25·9	27·2	25·9	33·2	United Kingdom	33·3	11·6	15·3	21·1
3. France	16·9	8·3	8·1	9·5	S. Africa Union	*2·3*[4]	18·4	10·0	6·8
4. S. Africa Un.	*1·4*[4]	0·3	3·3	3·3	Canada	—	—	3·1	—
5. Madagascar	5·3	1·5	3·1	3·1	Australasia	30·8	2·3	1·5	4·5
6. Australasia	5·7	3·7	2·4	1·5	Dependencies	—	1·2	1·0	1·1
7. United States	0·5	2·1	2·2	2·2	Hong-Kong	—	2·3	1·0	1·0

[1] Previous to 1912 rubber from Malay Peninsula transhipped at Singapore and Penang was included in imports and exports. Value in 1911 about £1,493,000.

[2] In 1910 and later years shipping charges are included in the value of the exports (£149,000 in 1909, £171,000 in 1910).

[3] Countries of consignment after 1906, previously countries of shipment.

[4] Cape Colony.

AUSTRALIAN COMMONWEALTH

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.			Percentages of Total Value.		
	1904–05	1906–10	1911–13	1904–05	1906–10	1911–13
1. Textiles, including blankets.	7·12	8·87	10·53	18·9	17·2	14·0
Piece goods, cotton and linen.	*3·00*	*3·87*	*4·72*	*8·0*	*7·5*	*6·3*
„ „ woollen	*1·85*	*2·09*	*2·28*	*4·9*	*4·1*	*3·0*
2. Iron and steel[1]	2·32	4·10	6·84	6·1	8·0	9·1
3. Machinery	2·21	2·96	4·53	5·9	5·8	6·0
4. Apparel	1·97	2·39	3·46	5·2	4·6	4·6
5. Wood and manufactures	1·14	1·91	3·12	3·0	3·7	4·2
6. Bullion and specie	1·37	1·54	1·73	3·6	3·0	2·3
7. Liquors	1·19	1·41	1·83	3·2	2·7	2·4
8. Paper	0·98	1·28	1·88	2·6	2·5	2·5
9. Bags and sacks	0·68	1·21	1·34	1·8	2·3	1·8
10. Wire and wire-netting	0·66	1·19	1·33	1·7	2·3	1·8
11. Tea	0·80	1·06	1·30	2·1	2·1	1·7
12. Chemicals and drugs	0·68	0·78	0·90	1·8	1·5	1·2
20. Motor Vehicles	0·12	0·43	1·57	0·3	0·8	2·1
Average total value	37·68	51·51	74·96			

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1904–05	1906–10	1911–13	1904–05	1906–10	1911–13
1. Raw wool	18·48	25·74	26·23	32·3	37·1	33·2
2. Bullion and specie	15·78	12·06	10·12	27·6	17·4	12·8
3. Wheat	4·73	5·87	8·01	8·3	8·5	10·1
4. Butter	2·41	2·97	3·85	4·2	4·3	4·9
5. Skins and hides	1·73	2·96	4·35	3·0	4·3	5·5
6. Copper and copper ore	1·88	2·64	2·88	3·3	3·8	3·6
7. Meat	1·63	2·53	4·24	2·9	3·7	5·4
8. Zinc and zinc ore	—	1·47	1·96	—	2·1	2·5
9. Flour	0·98	1·20	1·57	1·7	1·7	2·0
10. Tallow	0·67	1·16	1·88	1·2	1·7	2·4
11. Tin and tin ore	0·86	1·15	1·16	1·5	1·7	1·5
12. Lead	0·84	1·12	1·52	1·5	1·6	1·9
13. Coal and coke	0·83	1·08	1·06	1·4	1·6	1·3
14. Wood	0·90	0·94	0·95	1·6	1·4	1·2
Average total value	57·16	69·34	79·05			

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	1905	'06–10	'11–13	To	'04–05	'06–10	'11–13
1. United Kingdom	53·0	51·0	50·3	1. United Kingdom	47·5	47·6	42·8
2. United States	13·1	12·6	13·7	2. France	8·4	9·8	10·9
3. Germany	7·9	8·8	9·1	3. Germany	6·6	9·2	8·8
4. New Zealand	5·9	4·6	3·6	4. Belgium	4·8	7·2	8·5
5. India	3·7	4·0	3·4	5. United States	2·9	3·8	2·6
6. France	3·5	3·4	3·0	6. New Zealand	2·7	3·4	3·1
7. Switzerland	1·0	1·5	1·6	7. India	5·5	3·3	3·2
8. Ceylon	1·7	1·4	1·1	8. Ceylon	9·6	3·2	6·0
9. Belgium	0·7	1·3	1·5	9. Union of S. Africa	4·1	2·7	2·2
10. Japan	1·0	1·2	1·2	10. Japan	1·0	1·7	1·4
11. Canada	1·0	1·1	1·2	11. Hong-Kong	1·2	1·0	1·0
12. Java	0·8	1·0	1·2	12. Philippine Islands	0·6	0·8	0·7

It is stated in the original Commonwealth Trade Returns for 1904 that 'prior to September 1st, 1903, it was the practice in most of the States for goods of local produce dispatched from one Australian state to another for transhipment beyond the Commonwealth to be recorded only as interstate transfers from the original state, no notice being taken of the oversea export.' No reliable estimate of the value of these transhipments prior to September 1st, 1903, can be given, but in 1904 they amounted to £3,655,128. For this reason no absolute data as to the external commerce of the Commonwealth before 1904 are given, but the figures showing the relative distribution of the trade from 1861 are reproduced below from pp. 258 and 259 of the 'Statistical Account of Australia and New Zealand,' 1903–4, by T. A. Coghlan.

ORIGIN AND DESTINATION OF COMMODITIES (PERCENTAGES)

	'61–65	'66–70	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–04
Imports from—									
United Kingdom	69·80	64·94	69·34	72·30	73·34	70·98	71·27	64·58	57·86
British Possessions	13·28	19·43	18·28	14·89	12·88	12·34	11·64	11·08	12·45
Foreign Countries	16·92	15·63	12·38	12·81	13·78	16·68	17·09	24·34	29·69
Exports to—									
United Kingdom	59·48	68·25	75·63	74·20	74·91	76·57	70·66	59·86	46·64
British Possessions	38·53	30·12	21·07	22·00	15·83	8·81	8·37	12·41	27·57
Foreign Countries	1·99	1·63	3·30	3·80	9·26	14·62	20·97	27·73	25·79

[1] Including nails, rails, pipes, tinplate.

NEW ZEALAND

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions[1] Sterling.					Percentages of Total Value.				
	'71–75	'91–95	'01–05	'06–10	'11–13	'71–75	'91–95	'01–05	'06–10	'11–13
1. Iron manufactures	0·47	0·45	1·08	1·41	1·79	7·3	6·8	8·6	8·5	8·5
2. Machinery	—	0·19	0·72	0·87	1·15	—	2·8	5·8	5·2	5·5
3. Apparel	0·20	0·33	0·56	0·76	1·12	3·2	4·9	4·5	4·6	5·4
4. Cotton piece goods	0·10	0·38	0·52	0·75	0·93	1·6	5·6	4·2	4·5	4·5
5. Sugar	0·37	0·38	0·45	0·56	0·76	5·9	5·7	3·6	3·4	3·6
6. Drapery	0·83	0·32	0·48	0·55	0·56	13·0	4·8	3·9	3·3	2·7
7. Paper and stationery	—	—	0·35	0·47	0·59	—	—	2·8	2·8	2·8
8. Tobacco and manufrs.	0·09	0·13	0·25	0·37	0·46	1·5	1·9	2·0	2·3	2·2
9. Drugs and chemicals	—	0·12	0·26	0·37	0·43	—	1·7	2·1	2·2	2·1
11. Woollen piece goods	0·15	0·18	0·39	0·33	0·35	2·4	2·7	3·1	2·0	1·7
12. Fruit	—	0·13	0·21	0·30	0·35	—	1·9	1·7	1·8	1·7
13. Boots and shoes.	0·20	0·14	0·24	0·27	0·35	3·1	2·1	1·9	1·7	1·6
14. Tea	0·21	0·15	0·22	0·26	0·32	3·3	2·3	1·7	1·6	1·5
25. Motor vehicles	—	—	0·04	0·19	0·79	—	—	0·3	1·1	3·8
Average total value	6·37	6·71	12·41	16·54	20·94					

Principal Countries.	Percentages of Total Value.				
	'71–75	'91–95	'01–05	'06–10	'11–13
1. United Kingdom	59·2	64·3	59·7	59·9	59·9
2. Australia	33·5	19·5	15·4	16·8	13·4
3. United States	2·2	5·7	11·5	8·5	9·3
4. Fiji	—	2·8	3·4	3·3	3·7
5. India	—	2·7	2·4	2·2	1·9
6. Germany	—	1·1	2·0	2·2	2·9
7. Canada	—	0·1	0·6	1·3	1·8
8. Ceylon	—	0·7	1·2	1·3	1·3
9. Belgium	—	0·2	0·8	0·6	0·8
10. France	—	0·2	0·4	0·6	0·7
11. Japan	—	0·2	0·6	0·6	0·7
12. Java	—	—	0·2	0·4	0·4

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions[1] Sterling.					Percentages of Total Value.				
	'71–75	'91–95	'01–05	'06–10	'11–13	'71–75	'91–95	'01–05	'06–10	'11–13
1. Raw wool	2·62	4·14	4·23	6·87	7·22	48·2	45·1	29·4	35·7	33·9
2. Frozen or chilled meat.	—	1·15	2·73	3·39	3·95	—	12·6	19·0	17·6	18·6
3. Gold bullion	1·88	0·99	1·97	2·04	1·52	34·7	10·7	13·7	10·6	7·2
4. Butter	—	0·22	1·24	1·56	1·91	—	2·4	8·6	8·1	9·0
5. Skins and hides	—	0·29	0·51	0·95	1·02	—	3·2	3·6	4·9	4·8
6. Cheese	—	0·11	0·20	0·82	1·55	—	1·2	1·4	4·2	7·3
7. Tallow, oleo-margarine	0·06	0·20	0·43	0·58	0·65	1·2	2·2	3·0	3·0	3·1
8. Flax (Phormium)	0·08	0·16	0·55	0·55	0·47	1·4	1·8	3·8	2·9	2·2
9. Kauri gum	0·13	0·46	0·72	0·50	0·43	2·3	5·0	5·0	2·6	2·1
10. Timber	0·04	0·13	0·27	0·35	0·42	0·7	1·4	1·8	1·8	2·0
11. Coal (incl. bunker coal)	—	0·09	0·14	0·15	0·21	—	1·0	1·0	0·8	1·0
12. Oats	0·05	0·24	0·47	0·14	0·17	1·0	2·6	3·3	0·7	0·8
13. Meat, potted, &c.	0·11	0·07	0·09	0·11	0·12	2·0	0·8	0·6	0·6	0·6
Average total value	5·43	9·17	14·39	19·26	21·26					

Principal Countries.	Percentages of Total Value.				
	'71–75	'91–95	'01–05	'06–10	'11–13
1. United Kingdom	65·3	79·8	75·1	81·5	78·6
2. Australia	29·6	13·6	15·3	11·6	12·0
3. United States	3·2	4·7	4·2	3·0	3·1
4. Pacific Islands (for.)	—	—	0·7	0·8	0·7
5. Ceylon	—	—	—	0·6	0·3
6. Canada	—	—	0·1	0·5	2·1
7. Germany	—	0·1	0·1	0·5	1·2
8. Union of South Africa	—	—	3·3	0·4	0·3
9. Fiji	—	0·5	0·4	0·4	0·4
10. France	—	0·1	0·1	0·2	0·5

[1] F.o.b. prices in countries of origin + 10 per cent.

CANADA[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'75–80	'80–85	'85–90	'90–95	'95–'00	1900–05	'05–11	'11–14	'71–75	'75–80	'80–85	'85–90	'90–95	'95–00	'00–05	'05–11	'11–14
1. Iron & steel & manufs.	—	—	—	—	1·97	2·67	5·40	8·15	14·77	—	—	—	—	7·9	8·9	11·2	10·9	11·3
Do., earlier classification	3·88	1·85	2·58	2·68	2·45	—	—	—	—	15·2	9·7	10·7	11·5	9·8	—	—	—	—
4. Machinery & locomotives		0·23	0·59	0·37	0·45[2]	0·93	2·33	3·81	8·95		1·2	2·4	1·6	1·8	3·1	4·8	5·1	6·9
2. Coal and coke	0·60	0·68	1·70	1·68	2·04	2·10	3·65	5·94	9·56	2·3	3·6	7·0	7·2	8·1	7·0	7·6	7·9	7·3
3. Woollens	2·48	1·62	1·82	2·06	1·97[2]	1·76	1·60	3·97	5·43	9·7	8·6	7·5	8·9	7·9	5·9	5·4	5·3	4·2
5. Cottons	2·19	1·51	1·77	0·96	0·86	1·08	1·64	3·07	5·22	8·6	8·0	7·3	4·1	3·4	3·6	3·4	4·1	4·0
6. Wood and manufactures	—	—	—	0·53	0·54	0·76	1·47	2·41	4·80	—	—	—	2·3	2·2	2·5	3·1	3·2	3·7
7. Sugar	1·03	1·08	1·08	1·09	1·49	1·29	1·68	2·33	3·29	4·0	5·7	4·4	4·7	5·9	4·3	3·5	3·1	2·5
8. Drugs, chemicals, dyes	—	—	—	—	0·59	0·73	1·17	1·96	3·09	—	—	—	—	2·4	2·4	2·4	2·6	2·3
9. Fruit	—	—	—	0·41	0·53	0·60	0·92	1·75	3·09	—	—	—	1·8	2·1	2·0	1·9	2·3	2·4
10. Raw Cotton	0·09	0·19	0·49	0·69	0·72	0·75	1·22	1·75	1·81	0·4	1·0	2·0	3·0	2·9	2·5	2·5	2·3	1·4
11. Silk and manufactures	0·49	0·28	0·45	0·54	0·52	0·62	0·97	1·42	2·15	1·9	1·5	1·9	2·3	2·1	2·1	2·0	1·9	1·6
12. Maize	—	—	—	—	—	1·20	1·02	1·41	1·62	—	—	—	—	—	4·0	2·1	1·9	1·2
13. Wheat	1·37	1·25	1·00	0·59	0·70	0·93	0·95	1·20	1·33	5·4	6·6	4·1	2·5	2·8	3·1	2·0	1·6	1·0
18. Tea	0·88	0·66	0·73	0·69	0·65	0·68	0·74	0·98	1·38	3·4	3·5	3·0	3·0	2·6	2·3	1·5	1·3	1·1
Average total value	25·56	18·92	24·26	23·23	25·10	30·00	48·09	75·03	130·33									

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'75–80	'80–85	'85–90	'90–95	'95–'00	1900–05	'05–11	'11–14	'71–75	'75–80	'80–85	'85–90	'90–95	'95–00	'00–05	'05–11	'11–14
1. Wheat	1·24	2·06	1·58	0·97	1·78	2·86	4·11	9·72	19·81	7·0	12·5	7·5	5·2	7·7	9·0	9·5	17·0	23·9
2. Timber	4·69	3·44	4·50	4·21[3]	4·72	5·36	5·98	7·42	6·86	26·5	20·9	22·6	22·9	20·4	16·9	13·8	13·0	8·4
3. Cheese	0·60	0·84	1·49	1·33	2·82	3·53	4·53	4·73	4·16	3·4	5·1	7·5	9·9	12·2	11·1	10·5	8·3	5·1
4. Animals	0·50	0·74	1·68	1·98	2·12	2·35	2·71	2·61	1·24	2·8	4·5	8·5	10·7	9·2	7·4	6·3	4·5	1·5
Cattle	*0·16*	*0·32*	*1·00*	*1·24*	*1·56*	*1·67*	*2·18*	*2·22*	*0·93*	*0·9*	*2·0*	*5·0*	*6·7*	*6·7*	*5·3*	*5·0*	*3·9*	*1·2*
5. Silver and ore	—	—	—	0·03	0·06	0·48	0·42	2·37	3·91	—	—	—	0·2	0·3	1·5	1·0	4·1	4·8
6. Bacon and hams	0·30	0·18	0·18	0·14	0·44	1·70	2·70	2·03	1·21	1·7	1·1	0·9	0·7	1·9	5·4	6·3	3·5	1·5
7. Wheat flour	0·54	0·50	0·43	0·30	0·33	0·58	1·02	1·98	3·88	3·0	3·1	2·1	1·6	1·4	1·8	2·4	3·5	4·8
8. Gold ore, dust, &c.	0·26	0·24	0·19	0·18	0·08	1·02	3·89	1·72	2·18	1·5	1·4	0·9	1·0	0·4	3·2	9·0	3·0	2·7
9. Fish, fresh, salt, &c.	—	—	—	0·99	1·16	1·03	1·22	1·63	1·87	—	—	—	5·3	5·0	3·2	2·8	2·8	2·3
10. Copper ore	0·03	0·04	0·04	0·04	0·06	0·17	0·74	1·36	1·74	0·2	0·2	0·2	0·2	0·3	0·5	1·7	2·4	2·1
11. Canned lobster and salmon	—	—	—	0·46	0·72	1·04	1·08	1·27	1·58	—	—	—	2·5	3·1	3·3	2·5	2·2	1·9
12. Coal and coke	0·21	0·31	0·48	0·43	0·71	0·78	1·05	1·11	1·00	1·2	1·9	2·4	2·3	3·1	2·5	2·4	1·9	1·2
14. Wood blocks for pulp	—	—	—	—	0·07	0·16	0·36	0·92	1·36	—	—	—	—	0·3	0·5	0·8	1·6	1·7
15. Wood pulp	—	—	—	—	0·09	0·24	0·53	0·92	1·16	—	—	—	—	0·4	0·7	1·2	1·6	1·4
20. Butter	0·59	0·56	0·48	0·15	0·21	0·63	1·10	0·56	0·19	3·3	3·4	2·4	0·8	0·9	2·0	2·5	1·0	0·2
26. Barley and rye	0·73	1·14	1·53	1·19	0·42	0·18	0·22	0·28	0·84	4·1	6·9	7·7	6·4	1·8	0·6	0·5	0·5	1·0
Average total value	17·69	16·48	19·96	18·53	23·10	31·80[4]	43·20	57·27	81·37									

[1] Year ended 30th June down to 1906, thereafter 31st March. [2] For 1890–95, according to earlier classification, machinery, &c., £424,000; woollens, £1,930,000.
[3] Timber, 1885–90, according to earlier classification, £4,000,000.
[4] The figures for the periods ending with 1899–1900 include an estimated amount short in the exports to the United States (in 1899–1900, £1,120,000).

CANADA

COUNTRIES OF ORIGIN[1] AND DESTINATION

From	Percentages of Total Value.								
	1871–75	'75–80	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14
1. United States	39·1	50·4	44·3	45·5	47·8	58·4	60·3	60·3	65·1
2. United Kingdom	52·9	42·2	42·9	39·7	34·4	25·7	24·2	24·7	20·9
3. France	1·7	1·7	1·8	2·1	2·2	2·6	2·8	2·7	2·2
4. Germany	0·8	0·5	1·5	3·1	4·2	4·9	4·0	2·2	2·1
5. Br. W. Indies	0·8	0·9	1·8	1·0	1·1	0·7	1·2	1·8	0·9
6. Br. E. Indies	—	—	—	—	0·2	0·5	1·0	1·0	1·0
7. South America	0·3	0·1	1·0	0·9	0·4	0·6	0·5	0·8	1·0
8. Belgium	0·2	0·3	0·4	0·6	0·5	1·3	1·2	0·8	0·7
9. British Guiana	—	—	0·2	0·2	0·3	0·1	0·5	0·8	0·7
10. Switzerland	0·1	0·1	0·2	0·2	0·2	0·3	0·5	0·7	0·7
11. Japan }	0·8	0·7	0·8	1·3	1·3	1·2	0·7	0·6	0·5
18. China }			0·8	0·9	0·9	0·6	0·3	0·2	0·1
12. Newfoundland	1·2	0·8	0·6	0·4	0·7	0·4	0·4	0·5	0·3
Average total value	25·09	18·10	22·43	21·80	23·44	28·25	46·50	73·00	127·22

To	Percentages of Total Value.								
	1871–75	'75–80	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14
United Kingdom	48·2	53·2	48·4	47·2	54·9	59·0	54·6	49·5	46·5
United States	42·1	36·3	42·7	44·5	35·8	32·7	34·8	38·5	41·2
Australia }	0·1	0·3	0·4	0·5	0·4	0·9	1·4	1·1	1·1
New Zealand }								0·3	0·4
South America	1·3	0·9	1·1	1·4	0·9	0·7	0·8	1·4	1·0
Newfoundland	2·4	2·3	1·9	1·7	1·9	1·2	1·3	1·3	1·2
British W. Indies	2·4	2·6	1·8	1·6	1·6	1·0	1·1	1·0	1·1
Belgium	0·1	0·2	0·2	0·1	0·3	0·4	1·0	1·0	1·1
France	0·2	0·7	0·6	0·4	0·3	0·7	0·7	0·9	0·7
Germany	0·1	0·1	0·2	0·3	0·9	1·0	0·9	0·7	1·0
Cuba and Porto Rico	1·5	1·5	1·0	1·1	1·2	0·7	0·6	0·7	0·6

[1] Special imports.

NEWFOUNDLAND[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling.				Percentages of Total Value.			
	'71–75[2]	'00–05	'05–10	'10–13	'71–75	'00–05	'05–10	'10–13
1. Flour	330	303	376	397	23·2	16·9	16·2	13·1
2. Textiles	252	183	199	247	17·7	10·2	8·6	8·2
3. Meat, including bacon . . .	*103*[3]	132	187	243	*7·2*	7·4	8·1	8·0
4. Coal	—	88	125	170	—	4·9	5·4	5·6
5. Hardware	—	83	76	110	—	4·6	3·3	3·6
6. Machinery	—	56	71	116	—	3·1	3·1	3·8
7. Olein, lard oil, &c.	—	32	67	73	—	1·8	2·9	2·4
8. Molasses	77	56	58	59	5·4	3·1	2·5	2·0
9. Railway material	—	13	18	38	—	0·8	0·8	3·2
Average total value . . .	1,426	1,789	2,325	3,024				

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	'71–75	'00–05	'05–10	'10–13	'71–75	'00–05	'05–10	'10–13
1. Dried cod	872	1166	1573	1544	64·8	58·0	65·2	55·6
2. Iron ore	—	164	225	261	—	8·1	9·3	9·4
3. Tinned lobster	—	89	76	92	—	4·4	3·2	3·3
4. Cod oil, unrefined	107	71	73	58	7·9	3·5	3·0	2·1
5. Seal oil	150	80	73	65	11·2	4·0	3·0	2·3
6. Herring	—	72	70	77	—	3·6	2·9	2·8
7. Sealskins	91	68	63	67	6·8	3·4	2·6	2·4
8. Copper and ore	—[4]	86	55	38	—	4·3	2·3	1·3
9. Paper	—	—	—	283	—	—	—	10·2
Average total value . . .	1,346	2,012	2,412	2,777				

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–75	'00–05	'05–10	'10–13	To	'71–75	'00–05	'05–10	'10–13
1. Canada . .	25·8	35·6	35·3	33·2	1. Brazil . .	19·0	16·5	16·6	18·3
2. Utd. States .	25·3	30·5	34·9	35·3	2. Portugal .	14·3	15·9	14·8	10·0
3. Utd. Kingdom	37·3	27·2	23·7	26·1	3. Canada . .	4·9	10·4	14·1	14·3
4. Br. W. Indies.	3·8	3·1	2·5	2·0	4. Utd. Kingdom	30·7	20·5	13·0	21·4
5. Spain . .	1·0	1·0	0·9	0·7	5. Italy . .	3·7	2·8	11·0	7·5
6. Germany .	2·1	0·9	0·4	0·2	6. Utd. States .	3·9	13·0	10·0	9·8
7. Belgium .	—	0·2	0·3	0·2	7. Spain . .	13·9	3·7	8·3	8·0
8. Netherlands .	—	—	—	0·3	8. Br. W. Indies .	5·3	4·1	3·7	3·8

TRINIDAD AND TOBAGO

GENERAL IMPORTS,[5] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousand £.			Percentages of Total Value.		
	1901–06[6]	1906–10	1911–13	1901–06	1906–10	1911–13
1. Apparel and textiles .	403	455	520	14·6	14·4	10·6
2. Hardware and Machinery	218	226	315	7·9	7·2	6·4
3. Flour	183	217	253	6·6	6·9	5·2
4. Cacao, raw . . .	177	216	247	6·4	6·8	5·0
5. Balata gum . . .	132	192	471	4·8	6·1	9·6
7. Rice	117	121	154	4·2	3·8	3·2
8. Hides	84	98	168	3·1	3·1	3·4
Average total value	2,757	3,162	4,890			

GENERAL EXPORTS,[5] EXCLUDING BULLION AND SPECIE

Principal Articles.	1901–06	1906–10	1911–13	1901–06	1906–10	1911–13
1. Cacao	1,072	1,436	1,450	41·7	45·0	30·1
2. Sugar	502	548	511	19·5	17·2	10·6
3. Balata gum . . .	122	193	470	4·7	6·0	9·8
5. Asphalt . . .	161	159	210	6·3	5·0	4·4
6. Hides and skins . .	94	108	180	3·6	3·4	3·7
7. Apparel and textiles .	83	92	181	3·2	2·9	3·8
Average total value	2,568	3,193	4,816			

COUNTRIES OF ORIGIN[7] AND DESTINATION (PERCENTAGES)

From	1901–06[6]	1906–10	1912–13	To	1901–06	1906–10	1911–13
1. Utd. Kingdom	34·4	30·8	25·6	1. Utd. States .	32·2	31·7	29·0
2. Utd. States .	24·5	25·2	20·5	2. Utd. Kingdom	27·8	21·5	24·3
3. Venezuela .	19·7	24·5	26·9	3. France . .	15·4	18·8	10·0
4. Br. N. America	4·4	3·9	4·6	4. Br. N. America	4·7	9·0	4·4
5. Br. E. Indies .	3·0	3·6	2·8	5. Venezuela .	9·2	8·8	9·9
6. France . .	2·9	2·5	1·7	6. Germany .	2·1	4·8	8·9
7. Germany .	1·9	2·3	1·9	7. Br. W. Indies .	2·9	1·0	3·6

[1] Including Labrador from 1886.
[2] Years ended 31st Dec. down to 1895, 30th June thereafter.
[3] Salt pork only.
[4] £151,000 (11·8 per cent.) for 1876–80.
[5] Including transhipments, value for the three periods, £453,000, £677,000 and £2,164,000.
[6] Year ended 31st March to 1909, from 1909 onwards, 31st December.
[7] Countries of consignment from 1912.

BRITISH GUIANA[1]

IMPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling.				Percentages of Total Value.			
	'71–75	'01–06	'06–11	'11–13	'71–75	'01–06	'06–11	'11–13
1. Textiles	—	167	191	198	—	10·8	11·2	12·1
2. Flour	144	163	186	179	7·7	10·6	10·9	11·0
3. Manures	—	124	154	130	—	8·0	9·0	7·9
4. Machinery	83	89	78	61	4·4	5·8	4·6	3·7
6. Oils	30	36	52	56	1·6	2·3	3·0	3·4
7. Dried fish	74	54	49	40	4·0	3·5	2·9	2·5
Average total value . . .	1,877	1,543	1,706	1,636				

EXPORTS,[2] INCLUDING BULLION AND SPECIE

1. Sugar	1889	1173	1121	1168	75·4	62·0	61·1	59·2
2. Gold Bullion	—	357	252	220	—	18·9	13·7	11·2
3. Rum	352	118	123	156	14·1	6·2	6·7	7·9
4. Balata gum	—	51	98	135	—	2·7	5·3	6·8
5. Rice	47	10	47	62	1·9	0·6	2·5	3·1
6. Wood and timber . . .	—	27	27	31	—	1·4	1·5	1·6
7. Molascuit from 1903–04 . .	—	30	26	17	—	1·6	1·4	0·9
Average total value . . .	2,506	1,892	1,835	1,974				

COUNTRIES OF ORIGIN[3] AND DESTINATION[4] (PERCENTAGES)

From	'71–75	'01–06	'09–11	'12–13	To	'71–75	'01–06	'06–11	'12–13
1. Utd. Kingdom	51·9	53·8	49·5	55·7	1. Utd. Kingdom.	62·1	42·0	43·3	45·4
2. Utd. States .	20·6	30·7	27·0	24·7	2. Canada . .	—	22·1	36·6	39·6
3. Canada .	—	6·7	8·4	7·9	3. Utd. States .	26·4	31·7	12·4	5·8
4. Br. E. Indies	—	3·1	4·1	3·6	4. Br. W. Indies .	2·9	1·1	3·6	4·7
8. Br. W. Indies	5·5	2·0	1·2	2·1	5. Dutch Guiana.	—	1·0	1·6	2·6
Average total	18·77	14·66	16·81	16·22	Average total	25·06	18·15	18·23	19·19

JAMAICA[5]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling.				Percentages of Total Value.			
	—[6]	'01–06	'06–10	'11–13	—[6]	'01–06	'06–10	'11–13
1. Cottons	251	288	371	364	16·9	15·3	13·8	12·6
2. Wheat flour	149	162	245	307	10·0	8·6	9·1	10·5
3. Fish	155	157	192	207	10·4	8·3	7·1	7·1
4. Wood and timber	—	64	130	145	—	3·4	4·8	5·0
5. Apparel and slops . . .	15	62	85	79	1·0	3·3	3·2	2·7
6. Boots and shoes . . .	37	56	84	84	2·5	3·0	3·1	2·9
7. Maize and maize meal . .	31	48	82	106	2·1	2·6	3·0	3·6
8. Machinery	—	46	75	80	—	2·5	2·8	2·7
Average total value . . .	1,486	1,885	2,689	2,918				

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

1. Fruit	6	911	1276	1391	0·5	50·3	51·2	51·6
2. Rum	282	114	182	85	20·9	6·3	7·3	3·1
3. Sugar	518	133	144	144	38·4	7·3	5·8	5·4
4. Coffee	235	123	135	196	17·4	6·8	5·4	7·3
5. Logwood extract	—	48	123	171	—	2·6	4·9	6·3
6. Cacao	—	57	111	119	—	3·1	4·4	4·4
7. Piminto	33	95	92	83	2·4	5·3	3·7	3·1
8. Logwood	132	91	65	97	9·9	5·0	2·6	3·6
9. Ginger	17	36	45	48	1·2	2·0	1·8	1·8
Average total value . . .	1,349	1,811	2,491	2,696				

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'84–89	'01–06	'06–10	'11–13	To	'71–75	'01–06	'06–10	'11–13
1. Utd. Kingdom	55·3	48·4	45·0	42·4	1. Utd. States .	10·0	61·5	58·0	59·8
2. Utd. States .	32·3	41·0	43·9	43·4	2. Utd. Kingdom	81·2	19·4	21·3	15·0
3. Canada. .	9·3	7·1	7·1	9·0	3. Canada . .	1·0	4·5	6·0	6·1
4. Germany .	0·03	1·9	2·0	2·0	4. France . .	0·5	6·1	5·3	5·7
5. Br. W. Indies	1·1	0·9	1·0	0·9	5. Germany .	0·9	2·2	2·3	3·5
6. India . .	1·1	0·01	0·2	0·5	6. Br. W. Indies .	1·1	1·6	1·6	1·5

[1] Year ends Dec. 31 (March 31, 1891–1911).

[2] Dutiable articles 'warehoused for exportation or transhipped' are excluded from 1907–08 in the case of articles, and from 1900–01 in the case of countries. Average value, 1901–06, £77,000; 1906–11, £70,000.

[3] 'Countries of origin' from Oct. 1, 1908, to Dec. 31, 1911, thereafter 'countries whence consigned.'

[4] 'Countries of ultimate destination' from Jan. 1, 1912, previously 'countries to which exported.'

[5] Year ends Dec. 31 (Mar. 31 from 1891 to 1909, Sept. 30 previously).

[6] Sept. 1884–89 for imports ('Special Imports' before 1884); 1871–75 for exports.

GOLD COAST

GENERAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling. '86–90	'01–05	'06–10	'11–13	Percentages of Total Value. '86–90	'01–05	'06–10	'11–13
1. Cotton manufactures	144	335	472	683	33·2	17·7	19·2	16·1
2. Specie	44	224	414	1,015	10·1	11·8	16·8	23·9
3. Machinery	7	151	180	218	1·6	7·9	7·3	5·1
4. Provisions, including rice	9	176	160	295	2·0	9·3	6·5	6·9
5. Spirits	62	133	138	203	14·2	7·0	5·6	4·8
6. Apparel	5	62	81	96	1·2	3·3	3·3	2·3
7. Building material, including galvanised iron	—	55	68	143	—	2·9	2·8	3·4
8. Hardware and cutlery	13	50	63	112	3·0	2·6	2·6	2·6
9. Tobacco	14	39	55	89	3·2	2·1	2·3	2·1
Average total value	435	1,897	2,458	4,253				

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	'86–90	'01–05	'06–10	'11–13	'86–90	'01–05	'06–10	'11–13
1. Gold bullion	87	263	970	1,374	20·1	24·8	38·7	30·5
2. Cacao	—	122	603	1,915	—	11·5	24·1	42·5
3. Rubber	91	215	292	159	21·0	20·3	11·7	3·5
4. Specie	17	79	138	343	3·9	7·5	5·5	7·6
5. Palm oil	146	155	131	102	33·6	14·6	5·2	2·3
6. Lumber	—	53	128	245	—	5·0	5·1	5·4
7. Palm kernels	60	98	112	180	13·7	9·3	4·5	4·0
8. Kola nuts	1	48	82	124	0·3	4·5	3·3	2·8
Average total value	436	1,060	2,503	4,509				

COUNTRIES OF ORIGIN[5] AND DESTINATION (PERCENTAGES)

From	'86–90	'01–05	'06–10	'11–13	To	'86–90	'01–05	'06–10	'11–13
1. Utd. Kingdom	73·8	71·6	74·1	70·0	1. Utd. Kingdom	80·5	60·9	72·4	63·9
2. Germany	9·2	12·6	10·2	8·4	2. Germany	11·0	20·3	14·2	16·1
3. Holland	1·0	2·7	5·3	4·3	3. South Nigeria	—	5·6	6·1	7·9
4. South Nigeria	—	4·0	2·9	3·9	4. France	2·6	9·0	4·6	9·1
5. Togoland	—	—	2·0	2·3	5. Togoland	—	—	1·6	1·1
7. United States	13·1	3·3	0·9	5·1	6. United States	4·8	1·5	1·3	1·6

SOUTHERN NIGERIA[2]

GENERAL IMPORTS,[3] INCLUDING BULLION AND SPECIE

Principal Articles.	Aver. Value in Thous. Stg. —[4]	'11–13	Percentages. —[4]	'11–13
1. Cottons	1,294	1,499	22·1	23·3
2. Specie	735	598	12·6	9·3
3. Spirits	449	436	7·7	6·8
4. Iron and steel, exc. machinery	390	443	6·7	6·9
5. Tobacco and manufactures	216	226	3·7	3·5
6. Coopers' stores	195	172	3·3	2·7
7. Railway materials	163	83	2·8	1·3
8. Provisions	123	158	2·1	2·5
9. Rice	111	119	1·9	1·8
Average total value	5,857	6,438		

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	—[4]	'11–13	—[4]	'11–13
1. Palm kernels	1,709	2,827	42·2	45·0
2. Palm oil	1,332	1,735	32·9	27·6
3. Rubber	214	131	5·3	2·1
4. Specie	143	203	3·5	3·2
5. Raw cotton	75	110	1·8	1·7
6. Mahogany	64	80	1·6	1·3
7. Tin ore, from 1908	63	362	1·5	5·8
8. Cacao	60	151	1·5	2·4
9. Shea nuts and butter	45	55	1·1	0·9
Average total value	4,047	6,278		

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'06–10	'11–13	To	'06–10	'11–13
1. Utd. Kingdom	74·5	68·4	1. Utd. Kingdom	49·9	48·7
2. Germany	10·5	11·7	2. Germany	41·9	43·9
3. Holland	7·7	7·6	3. Holland	2·2	2·1
4. U.S., from '10	3·7	4·0	4. Gold Coast	1·3	2·5
5. Gold Coast	3·5	5·2	5. France	1·2	0·4
6. Sierra Leone	0·9	0·6	6. French Poss.	0·7	0·5

[1] From 1894 the value of the imports includes charges for freight, &c; prior to that merely the value at port of shipment. Charges in 1894 were 15·3 per cent. of value of imports. [2] Colony and protectorate. [3] Transit trade to and from Northern Nigeria is included; all transit trade to French or German possessions excluded. [4] 1906–10 for exports; 1910 for imports, owing to reclassification of returns; average total imports 1906–10, £4,538,000.
[5] 'Countries of consignment' from 1911 inclusive.

CAPE COLONY

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.			Percentages.		
	'71–75	'94–98	'01–05	'71–75	'94–98	'01–05
1. Gold bullion	—	9·95	11·08	—	52·6	47·7
2. Diamonds	0·15	4·29	5·80	3·5	22·7	25·0
3. Raw wool	2·80	1·69	1·78	65·8	8·9	7·7
4. Ostrich feathers	0·20	0·58	0·96	4·6	3·0	4·1
5. Angora hair	0·08	0·61	0·62	1·8	3·2	2·7
6. Hides and skins	0·36	0·47	0·49	8·4	2·5	2·1
7. Copper ore	0·27	0·26	0·48	6·4	1·4	2·1
8. Coal	—	0·11	0·14	—	0·6	0·6
9. Wine	—	0·02	0·02	—	0·1	0·1
Average total	4·26	18·93	23·23			

NATAL

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

1. Gold bullion	—	—	—	—	—	—
2. Coal	—	0·09	0·35	—	6·8	12·3
3. Raw wool	0·28	0·50	0·30	40·9	38·7	10·4
4. Raw sugar	0·17	0·04	0·11	24·0	3·3	3·9
5. Bark	—	0·02	0·08	—	1·5	2·9
6. Hides and skins	0·14	0·08	0·04	20·9	5·8	1·3
7. Maize	0·002	0·006	0·036	0·2	0·5	1·2
8. Angora hair & mohair	0·001	0·028	0·029	0·1	2·2	1·0
9. Tea	—	0·003	0·015	—	0·3	0·5
Average total	0·69	1·28	2·88			

BRITISH SOUTH AFRICA [1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.		Percentages.	
	—[2]	'11–13	—[2]	'11–13
1. Machinery	2·81	3·25	8·8	7·8
2. Cotton manufs.	2·36	3·27	7·3	7·8
3. Apparel	1·99	2·82	6·2	6·7
4. Haberdhy., millinery	1·65	1·52	5·2	3·6
5. Iron and steel	1·13	1·47	3·5	3·5
6. Railway materials	1·05	1·93	3·3	4·6
7. Boots and shoes	1·02	1·25	3·2	3·0
8. Wheat	0·79	0·67	2·5	1·6
9. Wheat flour and meal	0·70	0·64	2·2	1·5
10. Woollen manufs.	0·68	0·90	2·1	2·2
11. Wood and timber	0·68	1·06	2·1	2·5
12. Sugar	0·44	0·37	1·4	0·9
Average total	32·05	41·91		

Principal Countries.	Percentages.	
	'06–10	'11–15
1. United Kingdom	58·3	57·7
2. Germany	8·0	8·4
3. United States	7·5	8·2
4. Australasia	6·6	4·6
5. India	2·6	2·6
6. France	1·5	1·5
7. Canada	1·5	1·8
8. Portuguese E. Africa	1·5	1·9
9. Sweden	1·4	1·8
10. Belgium	1·4	1·9
11. Netherlands	1·3	1·8
12. Brazil	1·2	1·6
Total	31·36	41·91

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	—[2]	'11–13	—[2]	'11–13
1. Gold bullion	30·99	39·70	63·3	61·7
2. Diamonds	7·58	9·82	15·5	15·3
3. Raw wool	3·23	4·80	6·6	7·5
4. Ostrich feathers	1·86	2·61	3·8	4·0
5. Hides and skins	0·98	1·64	2·0	2·6
6. Angora hair	0·86	0·92	1·8	1·4
7. Coal	0·73	1·22	1·5	1·9
8. Copper and ore	0·53	0·61	1·1	1·0
9. Maize	0·35	0·33	0·7	0·5
10. Bark	0·16	0·29	0·3	0·5
11. Gold slag	0·11	0·07	0·2	0·1
12. Tin ore	0·11	0·29	0·2	0·5
Average total	48·95	64·33		

Principal Countries.	'06–10	'11–15
1. United Kingdom	92·2	90·4
2. Germany	2·8	2·9
3. Belgium	0·9	1·1
4. German S. W. Africa	0·5	0·2
5. United States	0·5	0·9
6. India	0·4	0·2
7. Portuguese E. Africa	0·3	0·3
8. France	0·2	0·3
9. Australasia	0·1	0·2
10. Belgian Congo	—	0·8

[1] Union of South Africa, Rhodesia, Basutoland, Bechuanaland, Swaziland.
[2] Imports 1903–10, Exports 1906–10 (Government imports are included from 1908).

UGANDA [1]

GENERAL IMPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	Aver. Value in £1,000.		Percentages.	
	—[4]	1911–14	1906–11	1911–14
1. Textiles	126	262	30·8	32·4
2. Bullion and specie	55	114	13·5	14·1
3. Ivory	32	22	7·9	2·8
4. Provisions, including flour	24	37	6·0	4·5
5. Hardware and tools	12	28	2·9	3·4
6. Wine and spirits	12	17	2·8	2·1
7. Machinery	11	24	2·7	3·0
9. Rubber	9	6	2·3	2·8
Bicycles and accessories	5	23		
Average total value	409	809		

GENERAL EXPORTS,[3] INCLUDING BULLION AND SPECIE

Principal Articles.	Aver. Value in £1,000.		Percentages.	
1. Raw cotton	89	268	29·0	51·0
2. Ivory	71	46	23·2	8·8
3. Hides and skins	44	70	14·3	13·3
4. Rubber	18	10	5·8	2·0
5. Chillies	10	12	3·1	2·4
6. Ghee	6	10	1·9	1·9
7. Sesame seed	4	11	1·4	2·2
8. Ground nuts	1·5	5	0·5	0·9
9. Coffee	0·3	12	0·1	2·2
Average total value	306	525		

COUNTRIES [5] OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'06–11	'11–14	To	'07–11	'11–14
1. United Kingdom	37·1	39·2	1. British East Africa	65·1	43·5
2. British East Africa	13·1	6·7	2. United Kingdom	30·2	44·0
3. Congo	11·6	3·4	3. Congo	2·0	8·4
4. United States	11·4	11·9	4. German Possessions	1·8	0·5
5. Germany	9·2	9·2			
6. India	5·8	16·5	Average total value	230[6]	567

NYASALAND [1]

GENERAL IMPORTS,[3] INCLUDING BULLION AND SPECIE

Principal Articles.	Aver. Value in £1,000.		Percentages.	
	1906–11	1911–14	1906–11	1911–16
1. Textiles	100	142	50·7	52·0
2. Provisions, including wine, &c.	20	27	10·1	10·0
3. Railway materials	15	0·3	7·5	0·1
4. Hardware, paints, oils, &c.	14	25	7·2	9·2
5. Specie	7	5	3·6	1·9
6. Alcohol, excluding wine and beer	2	3	1·2	1·1
7. Arms and ammunition	2	3	1·1	1·1
Average total value	197	274		

GENERAL EXPORTS,[3] INCLUDING BULLION AND SPECIE

Principal Articles.	Aver. Value in £1,000.		Percentages.	
1. Raw cotton	29	66	22·1	26·5
2. Specie	22	50	16·7	20·1
3. Tobacco	20	69	15·6	27·9
4. Coffee	14	9	10·5	3·5
5. Ivory	6	4	4·4	1·7
6. Rubber	5	16	4·2	6·6
7. Beeswax	4	5	2·8	2·1
Average total value	129	249		

COUNTRIES OF ORIGIN AND DESTINATION.

From	'06–11	'11–14	To	'06–11	'11–14
1. United Kingdom	72·1	70·8	1. United Kingdom	65·6	75·5
2. Germany and Ger. E.A.	9·9	9·2	2. Union of South Africa	7·3	8·7
3. India	4·9	4·3	3. Germany and Ger. E.A.	7·2	4·6
4. Netherlands	3·3	3·7	4. Portugal and Port. East Africa, from 1908–9	8·6	4·4
5. Portugal and Port. E.A.	2·6	6·2			
6. N.E. Rhodesia	1·5	0·9	5. N.E. Rhodesia	6·5	2·8
7. Union of S. Africa	0·9	1·6	6. Brit. E. Africa and Aden.	—	3·1

[1] Year ends March 31.
[2] Including transit trade (£56,000 in 1906–11) and government stores and specie.
[3] Including transit trade.
[4] 1906–11 for imports, 1908–11 for exports.
[5] Previous to 1911–12 'countries whence imported' and 'countries to which exported.'
[6] Excluding transit trade to 1911–12 inclusive.

BRITISH EAST AFRICA [1]

GENERAL IMPORTS OF PRIVATE MERCHANDISE

Principal Articles.	Average Value in Thousands Sterling.			Percentages.		
	1901–06	1906–11	1911–14	1901–06	1906–11	1911–14
1. Cottons, from 1903–4	158	221	509	29·2	26·7	28·9
2. Grain and flour	66	82	115	13·2	10·0	6·6
3. Provisions	48	67	100	9·7	8·2	5·7
4. Building materials	24	38	65	4·8	4·6	3·7
5. Spirits, wine, &c.	21	33	47	4·2	3·9	2·7
6. Hardware, cutlery, &c.	—	29	68	—	3·5	3·9
7. Agricultural implements	6	23	34	1·1	2·8	1·9
8. Tobacco	10	19	35	2·1	2·3	2·0
9. Copper and brass ware	9	15	27	1·7	1·8	1·5
10. Arms and ammunition	8	14	25	1·7	1·8	1·4
11. Kerosine	7	13	18	1·4	1·5	1·0
Average total value	498	825	1,762			

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

1. Hides, horns, and skins	51	162	344	28·2	28·2	27·7
From British East Africa	*17*	*37*	*140*	*9·3*	*6·4*	*8·4*
2. Ivory	60	87	62	33·3	15·1	5·0
From British East Africa	*22*	*22*	*12*	*12·5*	*3·8*	*1·0*
3. Cotton, raw, from 1904–5	2	76	326	0·6	13·2	26·2
From British East Africa	*1*	*4*	*8*	*0·3*	*0·7*	*0·6*
4. Rubber	20	57	34	11·2	10·0	2·7
From British East Africa	*13*	*19*	*17*	*7·2*	*3·3*	*1·3*
5. Grain	25	51	205	14·1	8·9	16·5
6. Gold bullion	—	26	28	—	4·5	2·2
7. Copra	10	22	32	5·6	3·8	2·6
8. Coffee, from 1909–10	—	14	55	—	1·8	4·4
9. Chillies, from 1904–5	9	9	13	3·6	1·6	1·1
Average total value	179	575	1,245			

COUNTRIES OF ORIGIN / COUNTRIES OF DESTINATION

From	Percentages.			To	Percentages.		
	'01–06	'06–11	'11–14		'01–06	'06–11	'11–14
1. United Kingdom	30·4	37·8	41·2	1. United Kingdom	18·6	28·0	42·6
2. India	29·2	22·9	18·0	2. United States	30·6	19·1	7·5
3. Germany	10·2	8·8	9·1	3. Germany	10·7	15·6	13·0
4. United States	7·0	7·1	9·2	4. France	8·2	13·2	15·6
5. Netherlands	5·0	5·9	5·5	5. Zanzibar	20·2	7·5	5·3
6. Austria-Hungary	2·9	2·9	2·4	6. India	3·2	3·6	3·3
7. France	1·8	2·0	1·4	7. Belgium	2·3	2·7	1·4
				8. Italy	—	0·8	2·2

GROSS IMPORTS

Gross Imports.	Average Value in Thousands Sterling.			Percentages of Gross Total.		
	1901–06	1906–11	1911–14	1901–06	1906–11	1911–14
For British East Africa Administration	31	65	81	3·9	5·1	2·9
For Uganda Administration	19	24	43	2·4	1·9	1·5
For Uganda Railway	100	54	283	12·6	4·2	10·2
Goods in transit from 1903–4	*69*	202	227	—	15·7	8·1
Bullion and specie	103	114	255	13·0	8·9	9·3
Private merchandise	498	825	1,762	62·9	64·2	63·2
Average gross total value	793	1,285	2,786			

[1] Year ends March 31.

FRANCE

SPECIAL IMPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Wool, raw and waste	12·59	12·69	12·36	14·33	13·49	16·75	16·39	24·35	27·39	8·9	7·3	6·7	8·5	8·3	9·8	9·0	9·8	8·3
2. Cotton, raw	8·94	8·32	7·93	7·45	7·45	7·72	11·99	17·23	22·68	6·3	4·8	4·3	4·4	4·6	4·5	6·6	7·0	6·9
3. Coal, coke, &c.	6·84	6·33	6·72	6·83	7·02	9·91	10·54	16·19	20·06	4·8	3·6	3·6	4·0	4·3	5·8	5·8	6·5	6·1
4. Silk, raw, thrown, waste, &c.[2]	*14·77*	*13·83*	*11·96*	*10·33*	9·28	10·39	11·77	13·96	12·76	*10·4*	*8·0*	*6·5*	*6·1*	5·7	6·1	6·4	5·6	3·9
5. Oil-seeds and fruits	4·59	5·39	6·69	6·34	7·18	6·21	8·46	11·48	14·63	3·2	3·1	3·6	3·8	4·4	3·6	4·6	4·6	4·4
6. Machinery	0·99	1·57	2·80	1·71	2·18	3·63	4·61	8·58	11·94	0·7	0·9	1·5	1·0	1·3	2·1	2·5	3·5	3·6
7. Hides and skins, raw	6·36	6·54	7·10	6·83	6·06	5·26	6·37	7·30	8·89	4·5	3·8	3·8	4·0	3·7	3·1	3·5	3·0	2·7
8. Common timber	5·72	9·00	8·08	6·38	6·05	6·28	6·76	7·14	7·68	4·0	5·2	4·4	3·8	3·7	3·7	3·7	2·9	2·3
9. Rubber and gutta-percha	—	—	—	—	—	1·55	2·63	6·99	8·75	—	—	—	—	—	0·9	1·4	2·8	2·7
10. Wine.	0·79	4·38	14·30	17·06	9·97	10·45	5·17	5·95	12·84	0·6	2·5	7·8	10·1	6·1	6·1	2·8	2·4	3·9
11. Copper	1·49	1·66	1·60	1·68	1·52	3·36	3·42	5·62	7·89	1·0	1·0	0·9	1·0	0·9	2·0	1·9	2·3	2·4
12. Coffee	3·11	4·06	3·53	5·35	6·11	4·55	3·72	4·39	8·68	2·2	2·4	1·9	3·2	3·7	2·7	2·0	1·8	2·6
14. Flax.	3·27	2·80	2·60	2·31	2·35	2·43	3·17	3·30	4·59	2·3	1·6	1·4	1·4	1·4	1·4	1·7	1·3	1·4
16. Wheat and flour.	—	—	—	8·51	10·79	5·60	2·26	2·92	7·03	—	—	—	5·0	6·6	3·3	1·2	1·2	2·1
Total grain	10·45	21·22	15·91	13·25	—	—	—	—	—	7·3	12·3	8·6	7·8	—	—	—	—	—
19. Cottons	2·54	2·72	2·87	1·84	1·47	1·63	2·02	2·44	2·41	1·8	1·6	1·7	1·1	0·9	0·9	1·2	1·0	0·7
27. Wool manufactures	3·06	2·90	3·34	2·63	2·23	1·73	1·57	1·70	1·86	2·2	1·7	1·8	1·6	1·4	1·0	0·9	0·7	0·6
Average total value	141·9	171·7	183·4	168·8	163·0	171·5	182·8	247·3	329·2									

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES OF TOTAL VALUE)

From	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. United Kingdom	13·7	14·3	14·3	12·8	12·7	12·9	12·4	13·7	12·7
2. Germany	8·4	9·5	9·6	8·0	8·1	8·1	9·5	10·8	12·1
3. French Poss.	5·2	4·4	3·7	7·0	9·0	9·4	10·2	10·8	10·8
Algeria	*3·3*	*2·9*	*2·2*	*3·9*	*4·8*	*5·1*	*5·1*	*4·9*	*5·2*
4. United States	5·9	11·4	7·9	7·1	9·6	10·8	10·6	10·5	10·8
5. Belgium	12·6	9·8	10·1	10·6	9·5	7·6	7·1	6·9	6·6
6. British India	2·8	3·3	4·8	4·5	5·1	3·8	5·0	5·2	4·3
7. Russia	4·9	6·5	4·7	4·7	5·3	5·2	5·3	4·7	5·2
8. Argentina	2·6	3·0	3·8	4·9	4·4	5·8	5·5	4·6	4·1
9. China	1·7	2·2	1·8	2·6	3·0	3·5	3·9	3·0	2·6
10. Italy	10·0	8·7	8·1	5·0	3·2	3·3	3·3	2·9	2·5
11. Australasia	—	—	—	0·5	1·5	2·0	1·7	2·8	3·2
12. Spain	3·4	4·1	7·7	8·7	6·3	6·2	3·6	2·8	2·8
13. Brazil	1·3	1·3	1·2	1·6	1·9	1·8	1·9	2·1	2·4

To	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
United Kingdom	26·2	28·1	26·2	26·5	29·4	30·9	28·1	22·9	20·3
Belgium	13·4	13·0	—	14·6	14·8	14·7	15·0	15·5	17·0
Germany	10·6	11·1	9·9	9·3	10·3	10·8	12·0	12·3	12·2
French Poss.	4·9	5·3	5·6	6·5	9·2	10·9	12·2	12·3	13·6
Algeria	*3·8*	*4·2*	*4·7*	*5·2*	*5·9*	*6·3*	*6·7*	*7·1*	*8·5*
Tunis	—	—	—	*0·5*	*0·6*	*0·8*	*1·1*	*1·5*	*1·6*
Indo China	—	—	—	*0·3*	*0·5*	*1·0*	*1·6*	*1·2*	*1·2*
United States	8·3	7·5	9·2	8·2	7·0	6·3	6·0	7·3	6·4
Switzerland	8·1	7·2	6·7	6·4	5·6	5·3	5·7	6·1	6·1
Italy	5·8	5·5	5·5	4·6	3·7	4·0	4·1	5·0	4·5
Spain	3·4	4·3	4·8	4·9	3·9	3·0	2·7	2·3	2·1
Argentina	2·1	2·1	3·1	3·8	1·6	1·4	1·4	2·3	2·8
Russia	1·1	0·9	0·6	0·4	0·6	0·9	1·3	1·2	0·9
Turkey	2·1	1·4	1·3	1·5	1·6	1·3	1·1	1·2	1·3

For notes, see page 729.

FRANCE

SPECIAL EXPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Cottons	2·85	2·61	3·75	4·46	4·23	5·87	7·96	12·78	15·33	1·9	1·9	2·7	3·2	3·2	3·9	4·6	5·7	5·7
2. Silks	17·54	10·15	10·35	9·68	9·77	10·44	11·46	12·68	11·69	12·2	7·5	7·6	7·0	7·3	7·0	6·6	5·7	4·4
3. Wool, raw combed, waste	3·85	3·93	3·86	5·39	5·00	7·81	9·16	11·58	14·50	2·6	2·9	2·8	3·9	3·7	5·2	5·2	5·2	5·4
4. Woollens . . .	12·66	13·07	14·37	14·20	12·00	10·19	8·46	8·72	7·63	8·7	9·6	10·6	10·3	9·0	6·8	4·8	3·9	2·8
5. Wine	10·13	9·09	9·83	10·05	8·82	9·05	9·14	8·64	9·15	7·0	6·7	7·2	7·3	6·6	6·0	5·2	3·9	3·4
6. Haberdashery . . .	—	7·06	5·42	5·45	6·17	6·28	6·60	7·53	7·51	—	5·3	4·0	4·0	4·6	4·2	3·8	3·4	2·8
7. Raw silk . . .	4·57	5·89	6·60	5·36	4·74	4·81	6·09	6·81	5·91	3·1	4·3	4·9	3·9	3·5	3·2	3·5	3·1	2·2
8. Apparel	3·33	3·20	3·01	3·87	4·73	4·51	5·08	5·86	10·19	2·3	2·4	2·2	2·8	3·5	3·0	2·9	2·6	3·8
9. Motor vehicles, from 1897 .	—	—	—	—	—	0·16	2·15	5·74	8·48	—	—	—	—	—	0·1	1·2	2·4	3·2
10. Chemicals, excluding dyes.	1·71	2·10	2·42	1·93	2·26	3·08	3·91	5·46	8·11	1·2	1·6	1·8	1·4	1·7	2·1	2·2	2·4	3·0
11. Millinery . . .	—	—	—	—	1·96	3·31	4·95	5·20	3·88	—	—	—	—	1·5	2·2	2·8	2·3	1·4
12. Iron and steel and manufs.	—	—	—	—	—	2·85	4·20	5·14	5·71	—	—	—	—	—	1·9	2·4	2·3	2·1
Metal wares . . .	3·22	2·65	2·74	3·04	2·92	3·61	—	—	—	2·2	1·9	2·0	2·2	2·2	2·4	—	—	—
13. Hides, raw . . .	1·54	1·91	2·83	2·53	2·84	3·49	4·81	4·86	5·80	1·1	1·4	2·1	1·8	2·1	2·3	2·8	2·2	2·2
14. „ tanned. . .	3·79	3·46	4·19	4·02	4·04	4·32	4·75	4·36	6·28	2·6	2·5	3·1	2·9	3·0	2·9	2·7	2·0	2·3
15. Machinery . . .	—	—	—	1·47	1·47	2·16	2·37	3·67	4·62	—	—	—	1·1	1·1	1·4	1·4	1·6	1·7
18. Leather wares. . .	5·53	6·24	5·86	5·41	4·08	2·98	2·55	3·16	3·37	3·8	4·6	4·3	3·9	3·1	2·0	1·5	1·4	1·3
24. Sugar, refined . . .	4·82	4·63	2·72	2·26	1·99	1·82	1·91	2·18	2·87	3·3	3·4	2·0	1·6	1·5	1·2	1·1	1·0	1·1
33. „ raw . . .	2·43	1·01	0·71	1·14	1·86	2·79	1·86	1·20	0·30	1·6	0·7	0·5	0·8	1·4	1·8	1·1	0·5	0·1
Average total value .	144·0	135·1	135·3	137·6	133·8	150·2	174·7	222·9	268·5									

The most notable changes among the exports are those of cottons, woollens, and iron and steel manufactures. The marked rise of the position of the cotton exports is mainly due to the preference accorded to French goods in French colonies and dependencies, and the decline under woollens chiefly to the diminishing importance of the British market for those goods owing to the development in Great Britain of the branches of the woollen industry for the products of which that country formerly looked largely to France. The marked rise of iron and steel manufactures is sufficiently explained in the text, and this again indicates the chief explanation of the notable advance in the import of coal, coke, &c., shown in the imports table.

[1] 'Official (mean actual) values' revised annually.
[2] Raw silk includes yarns in earlier group, value for which for 1891–95 was £9·53 million (5·8 per cent.).

BELGIUM [1]

SPECIAL [2] IMPORTS, INCLUDING BULLION AND SPECIE [3] FROM 1905

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Grain, all kinds	8·03	11·71	11·42	9·96	11·67	12·98	16·12	22·11	27·52	15·2	19·3	18·8	16·5	17·9	16·0	15·4	14·9	13·9
2. Raw wool	5·21	6·29	4·30	2·95	2·64	4·18	5·75	9·46	17·15	9·9	10·4	7·1	4·9	4·0	5·1	5·5	6·4	8·6
3. Oil-seeds	1·20	1·34	1·97	1·88	2·28	2·24	3·30	5·94	6·35	2·3	2·2	3·2	3·1	3·5	2·8	3·1	4·0	3·2
4. Wood for building	1·67	1·76	1·94	2·20	2·58	3·84	4·85	5·67	4·30	3·2	2·9	3·2	3·7	3·9	4·7	4·6	3·8	2·2
5. Flax and hemp, raw, ton [4]	*2·60*	*3·17*	3·06	2·86	1·78	2·26	5·77	5·36	5·68	*4·9*	*5·2*	5·1	4·7	2·7	2·8	5·5	3·6	2·9
6. Resins, petroleum, &c.	1·71	1·65	1·69	2·33	2·83	3·59	4·36	5·29	4·67	3·2	2·7	2·8	3·9	4·3	4·4	4·2	3·6	2·4
7. Hides, raw	2·96	1·80	2·59	2·38	2·17	2·51	3·04	4·80	7·19	5·6	3·0	4·3	4·0	3·3	3·1	2·9	3·2	3·6
8. Coal and briquettes	—	—	0·64	0·67	0·92	1·75	2·42	3·98	6·28	—	—	1·1	1·1	1·4	2·1	2·3	2·7	3·2
9. Raw cotton	1·84	1·35	1·36	1·04	1·15	1·32	2·12	3·15	8·48	3·5	2·2	2·2	1·7	1·8	1·6	2·0	2·1	4·3
10. Iron ore and pig iron	1·29	1·36	1·07	1·25	1·14	1·97	1·98	3·07	4·98	2·5	2·3	1·8	2·1	1·7	2·4	1·9	2·1	2·5
11. Dyes and dye stuffs.	0·42	0·43	0·55	0·59	0·82	1·27	1·80	2·87	2·53	0·8	0·7	0·9	1·0	1·3	1·6	1·7	1·9	1·3
12. Coffee	1·87	1·99	1·43	1·74	2·20	1·84	1·70	2·81	3·47	3·5	3·3	2·3	2·9	3·4	2·3	1·6	1·9	1·7
13. Machinery	—	—	—	0·46	0·66	1·31	1·81	2·71	3·98	—	—	—	0·8	1·0	1·6	1·7	1·8	2·0
Animals, excluding horses.	1·67	2·26	2·24	1·87	1·14	1·03	1·15	1·30	1·79	3·2	3·7	3·7	3·1	1·7	1·3	1·1	0·9	0·9
Diamonds, from 1897	—	—	—	—	—	2·15	2·68	3·21	4·06	—	—	—	—	—	2·6	2·6	2·2	2·0
Average total value	32·62	60·43	60·50	60·24	65·33	81·36	104·87	148·19	198·32									

SPECIAL [2] EXPORTS, INCLUDING BULLION AND SPECIE FROM 1905

Principal Articles.	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Iron and steel, and manufs.	—	—	—	—	—	—	6·75	8·79	11·86	—	—	—	—	—	—	8·1	7·6	7·5
Iron and steel	—	—	—	3·27	3·64	5·46	6·58	—	—	—	—	—	6·2	6·6	7·8	7·9	—	—
Iron rails, sheet, &c.	*2·03*	*1·95*	*1·65*	*1·60*	*1·43*	*2·05*	*2·26*	—	—	*4·7*	4·3	*3·1*	*3·0*	2·6	*2·9*	2·7	—	—
2. Machinery and locomotives [5]	*1·66*	*1·87*	*2·42*	2·99	3·24	3·78	3·87	7·76	8·58	3·9	4·1	4·6	5·7	5·8	5·4	4·7	6·8	5·4
3. Grain	1·84	4·09	4·22	2·77	3·75	3·30	3·63	6·21	6·53	4·3	9·0	8·1	5·3	6·8	4·7	4·4	5·4	4·1
4. Coal, coke, and briquettes.	4·14	2·93	3·17	3·39	3·91	4·69	4·66	4·62	5·27	9·7	6·4	6·1	6·5	7·1	6·7	5·6	4·0	3·3
5. Raw flax	3·29	2·75	2·62	2·33	1·80	1·97	3·25	4·06	5·62	7·7	6·0	5·0	4·4	3·3	2·8	3·9	3·5	3·6
6. Yarn, linen, hemp, and jute	1·56	1·92	2·59	3·00	2·30	2·71	3·34	3·56	5·24	3·6	4·2	4·9	5·7	4·2	3·9	4·0	3·1	3·3
7. Zinc, unwrought	0·86	1·07	1·37	1·17	1·38	1·91	2·41	3·43	4·80	2·0	2·3	2·6	2·2	2·5	2·7	2·9	3·0	3·0
8. Glass and glasswares	1·12	1·67	2·09	1·92	1·92	3·20	3·43	3·38	4·02	2·6	3·6	4·0	3·7	3·5	4·6	4·1	2·9	2·5
9. Raw hides	2·06	1·32	1·89	1·91	1·64	1·95	2·34	3·34	4·79	4·8	2·9	3·6	3·6	3·0	2·8	2·8	2·9	3·0
10. Cottons	—	—	—	0·82	0·93	1·03	1·55	2·51	3·72	—	—	—	1·6	1·7	1·5	1·9	2·2	2·4
„	0·70	0·77	0·84	0·80	—	—	—	—	—	1·6	1·7	1·6	1·5	—	—	—	—	—
11. Wool yarn	2·23	2·38	2·17	2·27	2·05	1·64	1·64	1·99	2·47	5·2	5·2	4·1	4·3	3·7	2·3	2·0	1·7	1·6
12. Sugar, raw	1·61	1·26	1·26	1·42	1·51	1·64	1·03	0·80	0·59	3·7	2·7	2·4	2·7	2·7	2·3	1·2	0·7	0·4
„ refined	—	—	0·28	0·37	0·61	0·77	0·60	0·99	1·67	—	—	0·5	0·7	1·1	1·1	0·7	0·9	1·0
13. Diamonds, from 1897	—	—	—	—	—	2·35	2·95	3·27	4·08	—	—	—	—	—	3·2	3·4	2·8	2·6
Average total value	42·52	45·32	52·07	52·49	55·47	70·03	83·05	114·92	158·06									

For notes, see page 731.

BELGIUM [1]

COUNTRIES OF ORIGIN AND DESTINATION

From	Percentages of Total Value.								
	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. France	24·0	22·2	19·8	19·4	18·2	16·6	16·3	16·6	18·3
2. Germany.	12·9	14·7	14·1	11·2	11·2	12·8	13·2	13·2	14·2
3. United Kingdom . .	17·9	14·7	13·1	12·7	11·6	13·5	12·1	12·3	10·2
4. United States . . .	7·6	12·0	11·2	9·6	9·8	12·3	10·2	7·9	8·3
5. Netherlands . . .	13·0	13·3	14·2	13·6	11·3	8·5	8·6	7·7	7·2
6. Argentina	4·7	3·4	3·2	4·2	5·2	5·1	6·3	7·5	6·2
7. Russia	5·7	7·9	8·0	7·2	6·2	6·2	7·0	7·2	5·5
8. Roumania	—	—	1·4	4·9	5·0	4·1	4·6	4·3	4·1
9. British East India . .	—	—	4·4	4·2	4·7	3·1	4·0	3·9	—
10. Australasia	—	—	0·4	0·5	1·1	1·9	2·0	3·3	3·3
11. Congo	—	–	—	0·1	0·7	1·3	1·9	1·8	1·2
12. Chile	—	—	—	—	1·1	1·4	1·4	1·5	1·3

To	Percentages of Total Value.								
	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
Germany	21·2	20·6	17·8	17·4	22·1	23·5	22·9	25·3	25·5
France	31·7	30·2	30·8	26·2	22·6	19·3	17·5	18·9	19·0
United Kingdom . . .	20·8	20·2	19·7	19·8	17·9	18·5	17·6	14·3	15·0
Netherlands	12·5	13·8	13·2	14·3	14·1	11·3	11·4	10·4	9·3
United States	1·4	1·5	3·1	3·6	3·6	3·5	4·2	3·4	3·7
Argentina	0·6	0·5	0·9	1·7	1·0	1·1	1·4	2·9	2·4
Italy	1·4	1·6	2·3	2·7	1·8	1·8	1·8	2·5	1·9
Russia	1·3	1·7	0·7	0·6	1·1	2·2	1·5	1·5	2·1
Brazil.	0·8	1·4	1·1	1·1	1·4	1·0	1·0	1·4	2·3
Switzerland	1·3	2·1	2·1	2·2	2·2	1·9	1·3	1·4	1·3
China	—	—	0·6	0·5	0·6	0·7	1·3	1·3	0·9
Spain	0·8	1·6	2·4	1·9	1·8	1·7	2·3	1·3	1·2

NETHERLANDS

Table showing the quantity of certain Dutch Imports and Exports, 1908, and their value, calculated on the bases of British prices and Dutch returns respectively. (See p. 21.)

IMPORTS

Commodities.	Quantity.	Value based on British Prices.	Value according to Dutch Returns (12 Gulden=£1).
	Mln. Kilog.	Mln. £	Mln. £
1. Coffee, raw	119·1	6·53	4·37
2. Copper, unwrought	102·2	6·07	8·52
3. Cotton, raw	52·7	3·15	2·64
4. Grain, wheat	1,093·0	9·07	11·84
5. „ maize	641·7	3·85	3·48
6. Indigo	1·4	0·42	0·72
7. Oleo-margarine	32·7	1·58	1·22
8. Sugar, raw	55·0	0·58	1·60
9. Tin, unwrought	18·5	2·42	1·54
10. Peruvian bark	7·6	0·28	—

EXPORTS

Commodities.	Quantity.	Value based on British Prices.	Value based on Dutch Returns (12 Gulden=£1)
	Mln. Kilog.	Mln. £	Mln. £
1. Cheese	53·6	4·56	1·57
2. Peruvian bark	4·7	0·20	15·76
3. Flax, raw	43·5	3·01	2·54
4. Margarine	42·4	2·13	2·83
5. Butter	33·1	3·72	2·76
6. Paper and manufactures . . .	150·3	3·56	5·47
7. Sugar, refined and candy . .	106·6	1·52	3·57
8. Tin, unwrought	15·6	2·04	1·30

[1] 'Declared values' in case of most duty-free goods, 'official values' revised annually for others. Comparing the Belgian tables with those of the United Kingdom, one may note in both (1) the great preponderance of food-stuffs and raw materials among the imports, and (2) a fairly close correspondence in the quinquennial fluctuations of the total value of imports and exports.

[2] A large quantity of duty-free goods are entered for home consumption although really in transit. Such goods when leaving the country are included in the statistics of exports of domestic produce.

[3] Bullion and specie have been included in totals from 1905 (1906–10 imports £4·70 [3·2 per cent.], exports £2·20 [1·9 per cent.]); diamonds from 1897, see tables.

[4] All vegetable fibres, excluding cotton, for 1870–80. [5] Excluding locomotives for 1870–85.

GERMAN EMPIRE [1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1872–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'72–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Grain	—	—	—	—	—	29·17	34·73	45·56	60·05	—	—	—	—	—	11·7	11·6	11·1	11·4
Grain, flour, and meal	19·59	28·83	18·50	15·25	23·24	32·37	—	—	—	11·3	16·5	12·1	8·9	11·7	13·0	—	—	—
2. Cotton, raw and waste	10·59	9·25	9·33	11·64	10·64	12·95	19·89	25·87	29·29	6·1	5·3	6·1	6·8	5·4	5·2	6·6	6·3	5·6
3. Hides and skins, raw	4·74	4·01	4·69	4·37	5·19	6·90	10·62	20·25	26·77	2·7	2·3	3·0	2·5	2·6	2·8	3·5	4·9	5·1
4. Chemicals, drugs and dyes	—	—	—	—	—	14·73	17·84	19·44	24·77	—	—	—	—	—	5·9	5·9	4·7	4·7
5. Raw wool	9·61	10·87	9·71	11·85	11·78	12·66	13·88	17·94	19·96	5·5	6·1	6·3	6·9	5·9	5·1	4·6	4·4	3·8
6. Timber and builders' material	—	—	—	5·55	7·19	12·56	10·78	13·54	16·49	—	—	—	3·2	3·6	5·0	3·6	3·3	3·1
7. Yarns, cotton, and wool	—	—	6·87	7·59	7·37	8·04	7·23	10·82	10·40	—	—	4·5	4·4	3·7	3·2	2·4	2·6	2·0
8. Copper, raw and scrap	1·43	0·96	0·72	0·97	1·74	4·51	5·79	10·75	15·77	0·8	0·6	0·5	0·6	0·9	1·8	2·2	2·6	3·0
9. Animals, living	7·90	9·86	9·05	8·32	11·15	7·28	10·07	9·78	9·73	4·5	5·7	5·9	4·8	5·6	2·9	3·4	2·4	1·9
10. Silk, floss, waste, and cocoons	4·94	5·49	6·13	7·52	6·16	6·40	7·23	8·82	9·13	2·8	3·1	4·0	4·4	3·1	2·6	2·4	2·1	1·7
11. Coal	2·09	1·28	1·12	2·18	3·14	4·10	5·03	8·49	9·39	1·2	0·7	0·7	1·3	1·6	1·6	1·7	2·1	1·8
12. Coffee	8·26	8·59	6·12	8·83	10·18	7·58	7·56	8·46	12·42	4·7	4·9	4·0	5·1	5·1	3·0	2·5	2·1	2·4
13. Caoutchouc and gutta-percha	—	—	—	—	1·23	2·74	4·34	7·51	8·58	—	—	—	—	0·6	1·1	1·4	1·8	1·6
14. Eggs	—	—	—	1·87	3·22	4·21	5·55	7·40	9·22	—	—	—	1·1	1·6	1·7	1·8	1·8	1·8
15. Grease and oleo-margarine	1·60	2·00	1·41	1·82	3·14	3·47	4·99	7·31	9·70	0·9	1·2	0·9	1·1	1·6	1·4	1·7	1·8	1·8
16. Iron ore	—	—	—	0·72	1·16	2·77	3·97	7·02	9·89	—	—	—	0·4	0·6	1·1	1·3	1·7	1·9
Average total value	174·0	173·9	153·0	171·9	198·5	249·0	300·3	412·1	525·7									

COUNTRIES[3] OF ORIGIN AND DESTINATION (PERCENTAGES)

From	1891–95	'96–1900	1901–05	1906–10	1912	To	1891–95	'96–1900	1901–05	1906–10	1912
1. United States, including Porto Rico and Panama Canal	11·4	15·6	15·5	15·0	14·8	1. United Kingdom	21·2	19·3	19·4	15·6	13·0
2. Russian Empire	11·5	13·4	13·5	14·3	14·6	2. Austria-Hungary	11·1	11·0	10·3	11·0	11·6
3. United Kingdom	13·5	12·2	9·9	9·5	7·9	3. United States	10·9	9·8	9·3	9·0	7·8
4. Austria-Hungary	13·8	12·5	11·7	9·3	7·8	4. Russian Empire	5·1	7·7	6·9	7·7	8·5
5. France and Algeria [4]	5·8	5·4	5·7	5·8	5·2	5. Netherlands	7·9	7·5	8·1	6·8	6·8
6. Argentina	2·5	3·1	4·5	4·9	4·2	6. France, Algeria and Tunis [5]	6·6	5·6	5·4	6·8	7·7
7. British East Indies	4·0	4·2	4·5	4·8	5·6	7. Switzerland	6·0	6·6	6·0	6·2	5·8
8. Belgium	4·9	4·0	3·6	3·5	3·6	8. Belgium	4·8	5·1	5·4	5·2	5·5
9. Italy	3·2	3·2	3·1	3·2	2·8	9. Italy	2·7	2·5	2·7	4·3	4·5
10. Netherlands	5·1	3·7	3·4	2·9	3·2	10. Denmark	2·6	2·9	2·9	3·0	2·8
11. Australia and New Zealand	2·1	2·0	2·1	2·7	2·7	11. Argentina	1·0	1·2	1·6	2·7	2·7
12. Brazil	3·1	2·0	2·3	2·6	2·9	12. Sweden	2·3	2·8	2·6	2·6	2·2
13. Switzerland	3·4	3·1	2·7	2·2	1·9	13. British East Indies	1·3	1·5	1·7	1·6	1·4
14. Netherlands East Indies	1·0	1·4	1·6	2·1	2·0	14. Norway	1·3	1·6	1·3	1·4	1·6
15. Sweden	1·4	1·9	1·5	1·8	2·0	15. Japan	0·6	1·2	1·1	1·3	1·2

For notes, see page 733.

GERMAN EMPIRE [1]

SPECIAL EXPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1872–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'72–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Iron and steel	—	—	—	—	—	19·02	29·28	39·77	59·06	—[3]	—	—	—	—	9·8	11·8	12·0	13·4
Iron wares, coarse	—	—	*4·66*	*4·74*	*4·99*	*7·62*	*10·37*	*11·97*	*17·49*	—	—	*3·1*	*3·0*	*3·3*	*3·9*	*4·2*	*3·6*	*4·0*
,, ,, *fine*	—	—	—	*1·81*	*2·72*	*4·49*	*7·53*	*11·75*	*12·28*	—	—	—	*1·2*	*1·8*	*2·3*	*3·1*	*3·5*	*2·8*
2. Chemicals, drugs and dyes	—	—	—	—	—	18·73	22·64	30·17	41·22	—	—	—	—	—	9·7	9·2	9·1	9·4
3. Machinery and locomotives	1·66	1·90	2·75	2·81	3·53	7·42	10·61	21·55	34·25	1·4	1·1	1·8	1·8	2·3	3·8	4·3	6·5	7·8
4. Cottons	—	—	3·59	7·22	7·72	9·62	14·77	18·31	20·73	—	—	2·4	4·6	5·1	5·0	6·0	5·5	4·7
5. Coal and coke	—	—	—	5·27	6·79	10·10	13·37	18·26	27·68	—	—	—	3·4	4·5	5·2	5·4	5·5	6·3
6. Woollens, clothes and stuffs	—	—	8.73	8·81	7·69	7·81	9·21	10·30	9·56	—	—	5·7	5·7	5·0	4·0	3·7	3·1	2·2
,, hosiery and other	—	—	—	—	—	2·80	2·86	2·77	2·90	—	—	—	—	—	1·4	1·2	0·8	0·7
7. Grain, flour, and meal	—	—	—	—	2·16	5·44	6·42	12·29	19·20	—	—	—	—	1·4	2·8	2·6	3·7	4·4
Grain, flour, potatoes, &c.	11·95	14·94	4·19	2·65	2·25	—	—	—	—	10·3	11·0	2·7	1·7	1·5	—	—	—	—
8. Hides and skins, total	—	—	—	—	—	4·30	7·67	12·24	17·90	—	—	—	—	—	2·2	3·1	3·7	4·1
9. Sugar, total	0·52	3·29	8·36	8·46	10·14	10·80	8·95	10·15	6·50	0·4	2·3	5·5	5·4	6·7	5·6	3·6	3·7	1·5
,, *refined*	—	*2·42*	*1·82*	*2·92*	*4·40*	*5·40*	*5·56*	*6·16*	*4·51*	—	*0·6*	*1·2*	*1·9*	*2·9*	*2·8*	*2·2*	*1·9*	*1·0*
,, *raw*	—	*0·86*	*6·55*	*5·54*	*5·74*	*5·40*	*3·39*	*3·90*	*1·86*	—	*1·7*	*4·3*	*3·6*	*3·8*	*2·8*	*1·4*	*1·2*	*0·4*
10. Silk manufactures	2·92	4·56	8·32	9·26	6·62	6·35	7·29	9·37	10·09	2·5	3·3	5·4	6·0	4·3	3·3	3·0	2·8	2·3
11. Leather	1·19	1·30	2·03	2·09	2·61	3·19	5·11	8·30	11·34	1·0	1·0	1·3	1·3	1·7	1·6	2·1	2·5	2·6
13. Yarns, cotton, and wool	—	2·88	2·90	2·98	2·91	3·51	4·56	5·39	6·29	—	2·1	1·9	1·9	1·9	1·8	1·8	1·6	1·7
14. Wearing apparel	—	—	—	5·38	4·58	5·84	7·07	5·25	5·82	—	—	—	3·5	3·0	3·0	2·9	1·6	1·3
24. Leather wares, exclud. gloves	1·86	2·52	4·60	5·09	3·39	3·10	2·28	2·58	3·84	1·6	1·8	3·0	3·3	2·2	1·6	0·9	0·8	0·9
Animals, excluding horses	4·91	6·11	6·04	2·76	0·73	0·46	0·52	0·22	0·13	4·2	4·4	3·9	1·8	0·5	0·2	0·2	0·1	0·0
Average total value	116·4	136·4	152·5	155·6	152·4	194·1	246·6	331·1	440·4									

[1] Wirtschaftsgebiet or Economic Union, including the free ports of Hamburg, Cuxhaven, Bremerhaven, and Geestemünde from March 1, 1906; previously Zollgebiet or Customs Union.

[2] 'Official values' revised annually, but since April 1909 'declared values' have been recorded for imports of vehicles, ships, &c., and for about 70 per cent. of the export articles. Totals include ships and improvement trade for home account after 1896.

[3] The Hanse towns were included in the Customs Union in 1889. For the five years previous 16·8 per cent. of the imports and 24·9 per cent. of the exports were credited to them, whereas in 1891–95 the figures were 0·3 per cent. and 1·3 per cent. respectively.

[4] Algeria 0·3 per cent. in 1906–10.

[5] Algeria and Tunis 0·1 per cent. in 1906–10.

SWITZERLAND

SPECIAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.					Percentages of Total Value.					Principal Countries.	Percentages.				
	1886–90	'96–00	1901–05	'06–10	1912	'86–90	'96–00	'01–05	'06–10	1912		'86–90	'96–00	'01–05	'06–10	1912
1. Silk, raw and spun	4·82	5·03	5·34	6·57	6·11	13·8	10·8	10·5	9·9	7·5	1. Germany	30·7	28·1	28·8	32·2	31·9
2. Wheat	2·66	3·06	3·26	3·79	4·83	7·6	6·6	6·4	5·7	5·9	2. France	25·9	23·4	23·1	20·7	21·2
3. Iron and steel	0·80	1·63	1·56	2·19	2·94	2·3	3·5	3·1	3·3	3·6	3. Italy	14·3	14·5	13·9	12·5	9·5
4. Coal, coke, &c.	0·97	2·11	2·43	3·55	3·88	2·8	4·5	4·8	5·4	4·8	4. Austria-Hungary	11·1	6·5	6·3	6·2	6·0
5. Animals, living	1·94	1·97	2·27	2·50	2·91	5·5	4·2	4·5	3·8	3·6	5. United Kingdom	5·5	4·7	4·5	6·0	5·7
6. Cottons[3]	1·04	1·09	1·37	2·05	1·91	3·0	2·3	2·7	3·1	2·3	6. Russia in Europe	2·7	5·1	5·5	4·4	3·9
7. Raw cotton	1·48	1·12	1·44	1·82	1·97	4·2	2·4	2·8	2·8	2·4	7. United States	2·9	4·9	4·6	3·9	4·1
8. Wearing apparel[3]	0·85	0·94	1·19	1·68	1·87	2·4	2·0	2·3	2·6	2·3	8. Belgium	3·2	2·3	2·1	2·0	1·9
9. Machinery, locomotives	0·44	0·92	0·77	1·65	2·18	1·2	2·0	1·5	2·5	2·7	9. Bulgaria, Roumania	0·4	1·1	1·4	1·8	2·5
10. Woollens[3]	1·63	1·43	1·35	1·57	1·51	4·6	3·1	2·7	2·4	1·8	and Servia					
11. Iron and steel manufactures	0·51	1·02	0·95	1·41	1·63	1·5	2·2	1·9	2·1	2·0	10. Egypt.	1·4	1·2	1·4	1·4	1·2
12. Wine	1·12	1·31	1·36	1·40	1·89	3·2	2·8	2·7	2·1	2 3						
Average total value	35·02	46·57	50·88	66·04	81·58											

SPECIAL EXPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	1886–90	'96–00	1901–05	'06–10	1912	'86–90	'96–00	'01–05	'06–10	1912	Principal Countries.	'86–90	'96–00	'01–05	'06–10	1912
1. Ribbons, embroidery, lace	3·43	3·53	4·55	6·88	8·47	12·4	11·0	12·3	15·1	15·2	1. Germany	24·8	24·4	23·3	23·7	22·5
2. Silks[3]	4·79	5·62	6·35	6·30	6·46	17·4	17·5	17·1	13·8	11·6	2. United Kingdom	15·2	19·7	19·5	16·4	16·7
3. Watches, clocks, &c.	3·52	4·29	4·85	5·62	6·95	12·8	13·3	13·1	12·3	12·5	3. United States	12·0	10·0	11·8	12·2	9·8
4. Silk, raw and spun	3·11	2·95	3·24	4·20	4·19	11·3	9·2	8·7	9·2	7·5	4. France	20·2	16·5	14·3	12·2	11·5
5. Machinery, locomotives	0·79	1·52	1·93	2·83	3·68	2·9	4·7	5·2	6·2	6·6	5. Italy	8·1	5·5	6·0	7·4	6·7
6. Cheese	1·54	1·60	1·72	2·23	2·59	5·6	5·0	4·6	4·9	4·7	6. Austria-Hungary	5·4	5·5	5·6	6·1	6·4
7. Cotton piece goods[3]	1·98	1·37	1·48	1·80	1·52	7·2	4·3	4·0	3·3	2·7	7. Russia in Europe	1·6	3·4	2·9	3·0	3·4
8. Condensed milk	0·47	0·84	1·22	1·18	1·88	1·7	2·6	3·3	2·6	3·4	8. Argentina, Uruguay					
9. Coal tar dyes	0·30	0·63	0·69	0·90	1·03	1·1	2·0	1·9	2·0	1·9	and Paraguay	1·1	0·9	1·2	2·0	2·5
10. Wool yarn and tissues[3]	0·57	0·60	0·68	0·79	0·78	2·1	1·9	1·8	1·7	1·4	9. Belgium	1·6	1·6	1·6	1·8	2·0
11. Hides and skins, raw	0·29	0·39	0·50	0·74	0·88	1·0	1·2	1·3	1·6	1·6	10. Spain	1·3	1·5	1·7	1·6	2·0
12. Cotton yarn	0·88	0·72	0·62	0·60	0·69	3·2	2·2	1·7	1·3	1·2	11. British India	1·6	1·5	1·7	1·4	1·6
Average total value	27·60	32·14	37·11	45·71	55·63											

[1] In most cases 'official values' revised annually, but 'declared values' are permitted for objects of art, science, silks, &c.
[2] 'Declared values.'
[3] After 1891 hosiery is included under apparel and not under cotton, silk, or wool manufactures as formerly.

DENMARK[1]

GENERAL[2] IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1886–90	'96–00	1901–05	'06–09	1912	Percentages of Total Value. '86–90	'96–00	'01–05	'06–09	1912
1. Grain	1·36	2·89	3·37	4·41	5·27	9·1	11·4	10·6	10·8	12·8
2. Oil cake	0·33	0·88	1·98	3·09	3·84	2·2	3·5	6·2	7·5	9·3
3. Coal, coke, &c.	1·03	1·73	2·03	2·65	3·71	6·8	6·8	6·3	6·5	9·0
4. Iron and steel manufactures	0·96	1·77	1·98	2·67	2·63	6·4	7·0	6·2	6·5	6·4
5. Wood and manufactures	0·89	1·39	1·46	1·91	2·30	5·9	5·5	4·6	4·7	5·6
6. Seeds	0·50	0·62	0·94	1·42	1·66	3·4	2·5	3·0	3·5	4·0
7. Wool manufactures[3]	1·05	0·98	1·15	1·28	1·12	7·0	3·8	3·6	3·1	2·7
8. Cotton, flax, hemp manufactures[3]	0·55	0·77	0·97	1·13	1·23	3·6	3·0	3·0	2·8	3·0
9. Oil	0·26	0·40	0·58	0·76	1·25	1·7	1·6	1·8	1·9	3·0
10. Coffee	0·61	0·83	0·65	0·78	1·03	4·1	3·3	2·0	1·9	2·5
12. Lard and fat	0·26	0·46	1·04	1·55	0·47	1·7	1·8	3·2	3·8	1·1
16. Sugar	0·30	0·34	0·38	0·39	0·22	2·0	1·3	1·2	1·0	0·5
18. Butter	0·54	1·70	2·17	1·67	0·28	3·6	6·7	6·8	4·1	0·7
Average total value	14·98	25·35	32·00	40·99	45·42					

Principal Countries.	Percentages. '86–90	'96–00	'01–05	'06–09	1912
1. Germany	34·6	30·1	32·1	33·4	38·4
2. United Kingdom	22·9	20·3	16·0	15·9	16·6
3. Sweden	13·9	11·4	9·5	8·3	8·4
4. United States	5·4	12·5	14·4	15·3	8·5
5. Russia	7·8	8·6	12·6	10·3	6·9
6. E. Ind., China, &c.	0·7	0·8	0·5	1·1	5·0
7. France	2·2	2·4	2·6	2·3	2·4
8. Netherlands	2·6	2·1	2·4	2·8	2·5
9. Belgium	2·4	1·6	1·6	1·4	1·2
10. Norway	2·1	1·6	1·6	1·6	1·1
11. Iceland	0·8	0·5	0·5	0·8	0·9
Average total value	14·98	25·35	32·00	40·99	45·42

EXPORTS,[4] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1886–90	'96–00	1901–05	'06–09	1912	Percentages of Total Value. '86–90	'96–00	'01–05	'06–09	1912
1. Butter	2·95	5·96	8·07	9·64	10·62	27·2	42·8	42·5	41·0	32·0
2. Meat	1·24	3·36	4·84	6·04	9·79	11·4	24·1	25·5	25·7	29·5
3. Animals	2·17	1·21	1·76	2·23	3·01	20·0	8·7	9·3	9·5	9·1
Cattle	*1·07*	*0·56*	*0·90*	*1·42*	*2·00*	*9·8*	*4·0*	*4·7*	*6·0*	*6·0*
Horses	*0·56*	*0·64*	*0·86*	*0·81*	*1·01*	*5·1*	*4·6*	*4·5*	*3·4*	*3·0*
4. Eggs	0·28	0·79	1·37	1·47	1·51	2·6	5·7	7·2	6·2	4·6
5. Hides and skins, raw	0·44	0·36	0·46	0·70	0·84	4·0	2·6	2·4	3·0	2·5
6. Fresh fish	0·29	0·20	0·36	0·40	0·57	2·7	1·4	1·9	1·7	1·7
7. Barley	0·35	0·26	0·25	0·28	0·64	3·3	1·9	1·3	1·2	1·9
8. Iron and steel manufactures	0·14	0·10	0·17	0·27	0·16	1·3	0·7	0·9	1·1	0·5
9. Lard and fat	0·15	0·05	0·10	0·18	0·27	1·4	0·4	0·6	0·8	0·8
10. Wheat and wheat flour	0·43	0·11	0·06	0·08	0·13	4·0	0·8	0·3	0·3	0·4
Average total value	10·85	13·92	19·01	23·52	33·15					

Principal Countries.	Percentages. '86–90	'96–00	'01–05	'06–09	1912
1. United Kingdom	52·5	59·6	57·8	53·1	54·7
2. Germany	25·2	18·5	19·8	21·3	26·6
3. Sweden	10·7	9·1	8·3	7·8	4·9
4. Russia	1·3	4·7	4·9	5·8	2·4
5. Norway	3·7	3·0	2·8	3·1	2·7
6. United States	1·1	1·2	3·3	4·6	1·4
7. Iceland	1·3	0·9	0·7	0·7	0·7
8. Netherlands	0·5	0·1	0·1	0·3	0·8
9. France	1·0	0·4	0·4	0·2	0·5
10. Belgium	0·7	0·3	0·3	0·3	0·3
11. East Indies, China	—	0·1	0·2	0·7	0·4
12. Greenland	0·5	0·3	0·3	0·2	0·3
Average total value	10·85	18·85	26·44	33·19	37·89

[1] 'Official values' determined annually.
[2] 'General imports' till 1909, thereafter 'special imports' in the case of articles; 'general imports exclusive of transhipments' in the case of countries.
[3] Exclusive of ready-made goods, but including yarns prior to 1895.
[4] In the case of articles, 'general exports' prior to 1895, thereafter special exports; in the case of countries, general exports prior to 1910, then general exports excluding transhipments.

AUSTRIA-HUNGARY[1]

SPECIAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.								Percentages of Total Value.							
	1876–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Raw cotton	3·07	3·98	4·56	4·20	4·83	7·67	11·07	13·74	6·6	7·7	9·6	7·6	7·4	9·7	10·3	9·3
2. Coal and coke, excluding lignite	—	—	1·48	2·35	3·54	4·30	7·13	9·18	—	—	3·1	4·2	5·4	5·5	6·7	6·2
3. Raw wool, from 1879	2·93	3·02	3·32	3·05	3·82	4·84	6·29	6·75	6·0	5·8	7·0	5·5	5·8	6·1	5·9	4·6
4. Machinery and locomotives	0·70	1·31	1·23	1·68	1·86	2·09	4·59	7·92	1·5	2·5	2·6	3·0	2·8	2·7	4·3	5·3
5. Hides and skins, raw	1·44	1·78	1·29	1·71	1·73	2·20	3·24	4·26	3·1	3·4	2·7	3·1	2·6	2·8	3·0	2·9
6. Leather and leather wares	1·64	1·59	1·30	1·55	1·91	2·10	2·86	4·24	3·5	3·0	2·7	2·8	2·9	2·7	2·7	2·9
7. Flax, hemp and jute, raw	1·06	1·30	1·33	1·50	1·62	2·04	2·59	3·75	2·3	2·5	2·8	2·7	2·5	2·6	2·4	2·5
8. Coffee	2·61	2·37	2·84	3·12	2·09	1·85	2·40	4·25	5·5	4·6	6·0	5·6	3·2	2·3	2·2	2·9
9. Silk and floss silk	—	—	—	1·47	1·53	1·83	2·33	2·61	—	—	—	2·7	2·3	2·3	2·2	1·8
10. Books and printed matter	—	—	—	1·31	1·55	1·98	2·28	2·60	—	—	—	2·4	2·4	2·5	2·1	1·8
11. Wool yarn	1·00	1·15	1·40	1·69	1·66	1·54	2·19	2·35	2·1	2·2	3·0	3·0	2·5	2·0	2·0	1·6
12. Raw copper, from 1878	0·22	0·36	0·32	0·54	1·05	1·32	2·11	3·47	0·5	0·7	0·7	1·0	1·6	1·7	2·0	2·3
13. Silk manufactures	1·31	1·30	0·99	1·07	1·32	1·30	2·09	2·43	2·8	2·5	2·1	1·9	2·0	1·7	2·0	1·6
20. Animals, other than horses.	2·29	1·39	0·89	1·08	0·94	1·48	0·24	0·57	4·9	2·7	1·9	1·9	1·4	1·9	0·2	0·8
Average total value	46·86	51·52	47·35	55·49	65·56	78·70	107·00	148·2								

SPECIAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	1876–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Wood and manufactures thereof	—	—	—	6·64	10·12	11·59	13·54	15·58	—	—	—	10·4	14·2	13·6	13·7	13·7
Manufactured	*1·06*	*1·43*	*1·38*	*1·54*	*1·79*	*1·95*	*2·97*	*3·59*	*1·9*	*2·3*	*2·3*	*2·4*	*2·5*	*2·3*	*3·0*	*3·2*
Half-manufactured	—	—	—	*3·18*	*4·70*	*5·50*	*6·94*	*7·96*	—	—	—	*5·0*	*6·6*	*6·4*	*7·0*	*7·0*
Unmanufactured	—	—	—	*1·92*	*3·63*	*4·14*	*3·63*	*4·03*	—	—	—	*3·0*	*5·1*	*4·8*	*3·7*	*3·5*
2. Sugar and molasses	3·88	5·37	4·55	6·51	6·39	6·86	9·16	10·59	7·1	8·9	7·5	10·1	9·0	8·0	9·3	9·3
3. Eggs	—	0·55	1·08	2·34	3·60	4·32	4·67	6·01	—	0·9	1·8	3·6	5·1	5·1	4·7	5·3
4. Lignite (and coal)	—	1·16	1·99	2·46	2·98	3·41	4·06	3·92	—	1·9	3·3	3·8	4·2	4·0	4·1	3·4
5. Glasswares	—	—	1·45	1·63	1·99	2·22	2·99	3·22	—	—	2·4	2·5	2·8	2·6	3·0	2·8
6. Woollens	1·99	2·25	2·09	1·48	1·66	2·19	2·84	2·94	3·6	3·7	3·4	2·3	2·3	2·6	2·9	2·6
7. Hides and skins, raw	0·69	0·98	0·77	1·18	1·46	2·01	2·76	3·70	1·2	1·6	1·3	1·8	2·1	2·3	2·8	3·2
8. Animals, other than horses	4·24	3·60	2·51	3·75	2·16	3·93	2·59	1·54	7·8	6·0	4·1	5·8	3·0	4·6	2·6	1·4
9. Cotton manufactures	0·56	0·72	0·59	0·52	0·59	1·00	2·26	3·13	1·0	1·2	1·0	0·8	0·8	1·2	2·3	2·8
10. Malt, from 1878	0·73	1·01	1·37	1·48	2·00	2·09	2·20	2·76	1·3	1·7	2·3	2·3	2·8	2·4	2·2	2·4
11. Leather manufactures	—	—	1·84	2·54	2·39	2·12	2·05	2·25	—	—	3·0	3·9	3·4	2·5	2·1	2·0
12. Paper, prepared and manufactured	—	—	—	1·04	1·18	·44	1·81	1·65	—	—	—	1·6	1·7	1·7	1·8	1·5
15. Barley and wheat	5·74	4·61	4·84	3·58	2·89	2·83	1·59	1·93	10·5	7·6	8·0	5·6	4·1	3·3	1·6	1·7
Average total value	54·61	60·45	60·63	64·20	70·83	85·51	98·58	113·9								

For note, see page 737.

AUSTRIA-HUNGARY

COUNTRIES[2] OF ORIGIN AND DESTINATION

Countries of Origin of Imports.	Percentages.				
	1891–95	1896–1900	1901–05	1906–10	1912
1. Germany	36·6	36·3	37·6	39·7	39·5
2. United States	4·4	7·7	8·6	8·9	9·8
3. United Kingdom	10·3	9·2	7·9	8·5	6·9
4. British East Indies	6·9	5·4	5·8	6·8	5·6
5. Russian Empire	5·2	6·5	5·9	6·0	6·4
6. Italy	6·7	7·1	5·8	4·8	4·5
7. France	3·5	3·3	3·4	3·5	3·4
8. Switzerland	3·5	3·2	2·8	2·9	2·6
9. Roumania	1·2	2·5	2·3	2·2	2·9
10. Brazil	4·1	2·7	2·3	2·1	2·2
11. Belgium	1·6	1·9	1·8	1·8	1·6
12. Turkish Empire	2·2	2·3	2·3	1·8	2·1
18. Serbia	2·5	2·3	3·0	0·7	1·1

Countries of Destination.	Percentages.				
	1891–95	1896–1900	1901–05	1906–10	1912
1. Germany	53·4	52·3	50·8	46·2	44·4
2. United Kingdom	7·8	9·5	9·4	9·7	9·4
3. Italy	7·1	7·6	7·4	9·0	8·8
4. Turkish Empire	2·8	3·4	3·9	4·5	4·8
5. Roumania	3·5	3·3	3·2	4·2	4·9
6. Switzerland	4·9	4·0	3·8	4·0	4·3
7. Russian Empire	3·0	3·8	3·6	3·3	3·3
8. France	4·0	3·5	3·2	3·1	3·1
9. United States	1·7	2·0	2·1	3·0	2·3
10. British East Indies	0·8	1·8	2·6	2·6	2·3
11. Egypt	0·9	1·3	1·5	1·7	1·2
12. Netherlands	1·3	1·4	1·6	1·2	1·1
13. Bulgaria	1·2	0·8	1·0	1·1	1·7

[1] The customs territory inclusive of Bosnia from 1880. 'Official values' mainly revised annually, but a few monthly (coffee, cereals, cattle, coal, &c.).
[2] Countries of origin and destination were not distinguished prior to 1891.

RUSSIA[1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Raw cotton	6·47	5·42	7·94	8·56	7·98	7·26	8·87	10·89	9·95	11·3	10·5	16·5	20·5	16·2	11·3	13·3	11·3	8·0
2. Tea	4·31	4·22	4·51	4·15	3·91	4·63	5·10	7·19	6·26	7·5	8·0	9·4	10·0	7·9	7·2	7·6	7·5	5·1
3. Metal wares	*3·35*	*2·43*	*2·76*	1·17	1·99	3·29	3·11	4·40	5·63	5·8	4·6	5·4	2·8	4·0	5·1	4·7	4·6	4·5
4. Raw wool[3]	*2·12*	*2·17*	*2·33*	*2·11*	1·28	1·46	2·09	3·95	5·25	*3·7*	*4·2*	*4·8*	*5·0*	2·6	2·3	3·1	4·1	4·2
5. Machinery and engines	2·69	3·37	1·70	1·92	0·68	1·44	2·11	3·01	6·06	4·7	6·5	3·5	4·6	1·4	2·2	3·2	3·1	4·9
21. Industrial machinery	—	—	—	—	—	1·78	0·48	0·82	1·27	—	—	—	—	—	2·8	0·7	0·9	1·0
6. Coal, coke, &c.	1·35	1·56	1·61	1·33	1·47	2·57	2·53	3·35	5·91	2·3	3·0	3·3	3·2	3·0	4·0	3·8	3·5	4·8
7. Rubber and gutta-percha	—	—	—	0·32	0·66	1·43	2·19	3·02	3·61	—	—	—	0·7	1·3	2·2	3·3	3·1	2·9
8. Fish, salted or dried	—	—	—	0·72	0·96	0·99	1·53	2·30	2·72	—	—	—	1·7	2·0	1·5	2·3	2·4	2·2
9. Raw silk	1·03	1·02	0·99	0·16	0·55	1·04	1·39	2·05	2·37	1·8	1·9	2·0	0·4	1·1	1·6	2·1	2·1	1·9
10. Wool yarn[3]	—	—	—	—	1·40	1·60	1·44	1·92	1·70	—	—	—	—	2·8	2·5	2·2	2·0	1·4
11. Chemicals and drugs	1·23	1·52	1·79	1·30	1·34	1·36	1·41	1·88	2·51	2·1	3·0	3·7	3·1	2·7	2·1	2·1	2·0	2·0
12. Plants and seeds	—	—	—	0·57	0·64	0·95	1·28	1·68	2·44	—	—	—	1·4	1·3	1·5	1·9	1·7	2·0
13. Cottons	—	—	—	0·40	0·40	0·53	0·73	1·62	1·59	—	—	—	1·0	0·8	0·8	1·1	1·7	1·3
14. Fruit, fresh or dried[4]	*1·36*	*1·06*	*1·14*	0·60	0·72	0·95	1·10	1·55	1·85	*2·4*	*2·0*	*2·3*	1·4	1·5	1·5	1·7	1·6	1·5
17. Wines	1·77	1·29	1·39	0·77	0·80	1·02	1·05	1·14	1·25	3·1	2·4	2·9	1·9	1·6	1·6	1·6	1·2	1·0
18. Cotton yarn	1·71	1·92	1·14	0·95	0·47	0·50	0·50	0·94	1·35	3·0	3·7	2·3	2·3	1·0	0·8	0·7	1·0	1·1
Average total value	57·00	52·00	48·00	41·91	49·35	64·29	66·73	96·09	123·7									

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Germany	42·3	47·6	38·5	29·4	26·6	33·5	35·7	39·5	45·4
2. United Kingdom	28·5	27·1	24·4	24·1	23·7	19·3	16·3	13·7	12·1
3. China	—	—	—	7·0	7·3	6·9	8·5	9·5	6·5
4. United States	3·0	1·9	—	9·3	7·8	8·3	7·6	6·9	7·5
5. France	5·1	3·7	4·0	3·7	4·9	4·4	4·3	4·5	4·8
6. Finland	—	—	—	2·8	3·4	3·1	3·8	3·5	3·6
7. Persia	—	—	—	2·6	2·8	3·3	3·9	3·2	3·0
8. Austria-Hung.	5·0	4·7	5·0	3·9	4·5	4·1	3·7	3·0	2·8
9. East Indies	—	—	—	—	—	—	1·5	1·9	2·6
10. Netherlands	1·8	1·6	1·4	1·0	1·1	1·4	1·7	1·6	1·6
11. Italy	2·6	1·7	2·0	1·8	2·5	1·6	1·6	1·5	1·3
12. Egypt	—	—	—	2·7	3·8	2·8	2·2	1·3	0·3

To	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
Germany	28·5	31·8	30·8	24·8	25·2	25·5	23·5	27·1	29·9
United Kingdom	39·9	31·3	32·3	32·9	25·6	20·8	22·2	21·2	21·6
Netherlands	4·4	6·3	6·7	6·9	6·4	10·0	10·9	11·6	10·1
France	8·6	10·6	8·0	6·7	8·3	8·8	6·8	6·6	6·5
Italy	2·2	1·6	2·4	4·5	4·5	5·4	5·5	4·3	3·5
Austria-Hungary	6·1	7·1	5·3	4·2	5·3	4·7	4·1	4·1	4·8
Belgium	2·6	3·3	4·9	3·8	3·7	3·8	3·9	4·0	3·9
Finland	—	—	—	2·6	2·8	4·5	4·4	4·0	3·3
Persia	—	—	—	1·3	1·8	2·5	2·7	2·6	3·5
Denmark	—	1·1	1·1	1·4	1·5	1·7	2·9	2·6	2·5
China	—	—	—	0·3	0·7	0·9	2·0	2·5	2·0
Turkey	2·4	2·0	2·0	2·9	2·6	2·1	2·1	1·9	2·0

For notes, see page 739.

RUSSIA[1]

SPECIAL EXPORTS,[2] EXCLUDING BULLION AND SPECIE

Articles.	Average Value in Millions Sterling.									Percentages.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Corn, flour, and meal.	22·45	28·82	28·73	34·56	32·41	34·09	49·04	58·74	58·25	46·2	52·5	51·9	51·5	48·8	46·2	49·4	46·2	36·3
Wheat and flour[4]	*12·99*	*14·59*	*14·74*	*17·65*	*15·38*	*16·75*	*22·90*	*27·67*	*21·47*	*26·9*	*26·7*	*26·7*	*26·2*	*23·1*	*22·7*	*23·0*	*21·8*	*13·4*
Barley	*1·15*	*1·74*	*2·61*	*3·70*	*4·93*	*4·71*	*7·88*	*14·12*	*16·16*	*2·3*	*3·2*	*4·7*	*5·5*	*7·4*	*6·4*	*7·9*	*11·1*	*10·1*
Oats	*2·34*	*3·82*	*4·49*	*4·08*	*3·96*	*3·20*	*5·83*	*4·73*	*5·47*	*4·8*	*6·9*	*8·1*	*6·1*	*6·0*	*4·3*	*5·9*	*3·7*	*3·4*
Rye and flour[5]	*5·65*	*8·11*	*5·89*	*5·88*	*4·31*	*5·67*	*6·68*	*4·65*	*3·76*	*11·6*	*14·7*	*10·6*	*8·8*	*6·5*	*7·7*	*6·7*	*3·7*	*2·4*
Maize	*0·32*	*0·56*	*1·00*	*1·72*	*1·90*	*1·37*	*2·25*	*2·74*	*3·99*	*0·6*	*1·0*	*1·8*	*2·6*	*2·9*	*1·9*	*2·3*	*2·2*	*2·5*
Bran	—	—	—	*0·50*	*0·67*	*1·11*	*1·86*	*2·43*	*3·84*	—	—	—	*0·7*	*1·0*	*1·5*	*1·9*	*1·9*	*2·4*
2. Wood	3·45	3·28	3·25	4·13	4·46	5·73	6·95	12·29	16·19	7·1	5·8	5·9	6·0	6·8	7·8	7·0	9·7	10·1
3. Flax, raw, and tow	6·03	5·90	6·03	5·80	6·14	5·91	6·56	7·18	12·25	12·5	10·8	10·9	8·6	9·3	8·0	6·6	5·6	7·6
4, Eggs	—	—	—	0·97	1·55	2·93	5·07	6·13	8·94	—	—	—	1·4	2·3	4·0	5·1	4·8	5·6
5. Butter	—	—	—	0·38	0·37	0·75	3·13	5·04	7·23	—	—	—	0·6	0·6	1·0	3·1	4·0	4·5
6. Oilcake	—	—	—	0·53	1·05	1·46	1·99	3·18	4·12	—	—	—	0·8	1·6	2·0	2·0	2·5	2·6
7. Petroleum	—	—	—	2·19	2·69	3·37	5·00	3·17	4·05	—	—	—	3·2	4·1	4·6	5·0	2·5	2·5
8. Sugar	—	—	—	1·81	1·98	2·16	2·13	2·77	5·98	—	—	—	2·7	3·0	2·9	2·1	2·2	3·7
9. Cotton manufactures.	—	—	—	0·53	0·84	1·16	2·04	2·43	3·99	—	—	—	0·8	1·3	1·6	2·1	1·9	2·5
12. Linseed	3·76	3·43	2·61	2·71	2·23	2·85	0·87	1·32	2·15	7·8	6·2	4·7	4·0	3·4	3·9	0·9	1·0	1·3
13. Hemp	1·63	1·62	1·59	1·71	1·56	1·05	0·99	1·17	1·84	3·3	2·9	2·9	2·6	2·4	1·4	1·0	0·9	1·1
17. Wool, raw and spun	1·33	1·53	1·38	1·92	0·96	0·76	0·61	0·62	1·19	2·7	2·7	2·5	2·9	1·5	1·0	0·6	0·5	0·7
Average total value	48·25	54·86	55·08	67·32	66·26	73·74	99·37	127·2	160·3									

[1] Russia in Europe 1871–85, Russian Empire from 1886. (Finland excluded in both cases, and Poland till 1877.)
[2] Declared values. [3] Raw wool includes yarn to 1890. [4] Fruit and vegetables, 1871–85. [5] Excluding flour, 1871–85.

NORWAY [1]

GENERAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	1912
1. Corn and meal	1·81	2·04	2·88	3·40	3·44	21·2	17·4	17·6	15·9	11·1
Rye and meal	*1·18*	*1·14*	*1·49*	*1·61*	*1·56*	*13·9*	*9·8*	*9·1*	*7·5*	*5·0*
Wheat and meal	*0·18*	*0·38*	*0·50*	*0·71*	*0·70*	*2·1*	*3·2*	*3·0*	*3·3*	*2·3*
Barley	*0·36*	*0·40*	*0·59*	*0·69*	*0·69*	*4·2*	*3·4*	*3·6*	*3·3*	*2·2*
2. Iron and steel and wares	0·50	0·78	1·56	1·77	3·08	5·8	6·7	9·5	8·3	9·9
3. Coal, coke, &c.	0·31	0·74	1·34	1·61	2·61	3·7	6·3	8·2	7·5	8·4
4. Woollens	0·60	0·63	0·54	0·59	0·81	7·0	5·3	3·3	2·8	2·6
5. Machinery and locomotives	0·14	0·26	0·38	0·82	1·44	1·6	2·2	2·3	3·8	4·6
6. Hides, skins, leather, &c.	—	0·30	0·41	0·65	0·98	—	2·5	2·5	3·0	3·1
7. Cottons	0·29	0·35	0·43	0·60	0·83	3·4	3·0	2·6	2·8	2·7
8. Coffee	0·54	0·73	0·49	0·57	0·90	6·4	6·2	3·0	2·7	2·9
Average total value	8·54	11·73	16·39	21·35	31·16					

Principal Countries.[2]	Percentages. '72–75	'91–95	'01–05	'09–10	1912
1. Germany	25·5	26·7	27·5	30·6	29·9
2. United Kingdom	30·2	27·8	25·5	23·5	26·4
3. Sweden	7·3	13·6	10·3	11·5	12·6
4. United States	—	4·9	4·1	7·0	6·0
5. Russia and Finland	8·8	8·9	10·7	6·5	4·2
6. Denmark	12·2	4·9	6·2	4·8	4·8
7. Netherlands	3·4	4·0	4·7	3·3	3·6
8. Belgium	1·6	3·7	4·1	2·9	2·9
9. France	5·1	2·4	1·6	2·6	2·7
Average total value	9·26	11·73	16·39	22·66	31·16

SPECIAL [3] EXPORTS EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	1912
1. Fish	1·89	2·17	2·62	3·25	4·13	32·0	31·5	27·5	25·5	22·9
Cod, dried	*0·89*	*1·34*	*1·35*	*1·70*	*2·26*	*15·1*	*19·5*	*14·2*	*13·4*	*12·5*
Herring, salt	*0·88*	*0·52*	*0·59*	*0·57*	*0·66*	*15·0*	*7·5*	*6·2*	*4·5*	*3·7*
2. Wood	2·45	1·57	2·10	2·16	1·79	41·5	22·6	22·0	16·9	9·9
3. Wood pulp	—	0·72	1·37	1·99	2·73	—	10·4	14·4	15·6	15·1
4. Printing paper	—	—	0·21	0·53	0·77	—	—	2·2	4·1	4·3
5. Packing paper	—	0·20	0·32	0·47	0·59	—	2·8	3·3	3·6	3·3
6. Condensed milk	—	—	0·34	0·40	0·44	—	—	3·6	3·1	2·5
7. Hides and skins	—	—	0·21	0·39	0·64	—	—	2·2	3·1	3·5
8. Train oil	0·32	0·34	0·33	0·33	0·78	5·4	4·9	3·4	2·6	4·3
9. Sulphur	0·06	0·03	0·15	0·29	0·52	0·9	0·5	1·5	2·2	2·9
10. Calcium carbide	—	—	0·05	0·26	0·45	—	—	0·5	2·1	2·5
11. Vessels	—	—	0·21	0·18	0·22	—	—	2·2	1·4	1·2
Average total value	5·90	6·91	9·54	12·76	18·03					

GENERAL EXPORTS

Principal Countries.	'72–75	'91–95	'01–05	'09–10	1912
1. United Kingdom	30·4	34·4	40·3	30·7	25·6
2. Germany	16·8	12·2	13·5	18·1	20·2
3. United States	—	1·1	1·5	8·0	9·0
4. Sweden [4]	11·2	15·7	8·0	6·9	5·8
5. France	9·2	5·9	4·4	4·3	4·0
6. Belgium	2·7	3·5	3·9	3·6	3·6
7. Russia and Finland	4·7	2·9	2·9	3·5	3·5
8. Netherlands	6·6	4·7	7·8	3·4	4·9
9. Spain	7·3	9·8	6·2	3·2	3·1
10. Denmark	5·8	3·5	4·3	2·2	2·3
Average total value	6·26	7·36	10·56	15·95	20·60

[1] 'Official values' revised annually.
[3] General exports, 1871–1875.
[2] Countries of consignment from 1909; previously countries of shipment.
[4] Values before 1909 incomplete.

SWEDEN [1]

SPECIAL IMPORTS [2]

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	1912
1. Coal and coke	0·75	1·65	3·26	3·64	5·11	5·7	8·5	11·1	10·3	11·7
2. Wheat, rye, and meal	*1·00*[4]	1·65	2·19	2·09	2·35	7·5[4]	8·5	7·5	5·9	5·4
3. Iron and steel and manufrs.	—	0·78	1·47	1·77	2·30	—	4·0	5·0	5·0	5·3
4. Coffee	0·83	1·47	1·21	1·56	2·13	6·3	7·6	4·1	4·4	4·9
5. Machinery and locomotives	0·64	0·60	1·14	1·55	1·41	4·8	3·1	3·9	4·4	3·2
6. Raw cotton	0·59	0·60	0·86	1·20	1·46	4·5	3·1	2·9	3·4	3·4
7. Skins, dressed and raw	0·51	0·54	0·86	1·15	1·51	3·9	2·8	2·9	3·2	3·5
8. Mineral oil.	0·14	0·37	0·76	1·09	1·23	1·1	1·9	2·6	3·1	2·8
10. Raw wool	0·35	0·27	0·68	0·86	1·09	2·7	1·4	2·3	2·4	2·5
11. Oil, non-mineral.	0·11	0·27	0·44	0·77	0·53	0·8	1·4	1·5	2·2	1·2
12. Woollens	0·90	1·12	0·65	0·66	0·55	6·8	5·8	2·2	1·9	1·3
13. Wood and manufactures	—	0·25	0·27	0·58	1·05	—	1·3	0·9	1·6	2·4
Sugar, raw and refined	0·85	0·39	0·09	0·03	0·03	6·5	2·0	0·3	0·1	0·0
Average total value	13·20	19·42	29·31	35·47	43·49					

Principal Countries.[3]	Percentages. '71–75	'91–95	'01–04	'06–10	1912
1. Germany	22·6	33·3	38·1	35·1	34·7
2. United Kingdom	33·0	27·1	26·4	25·5	24·2
3. United States	2·2	3·3	2·1	8·8	7·6
4. Denmark and Iceland	15·9	11·7	12·7	7·0	6·8
5. Russia and Finland	8·0	5·7	6·0	5·5	6·6
6. France	3·3	2·4	1·8	3·5	4·2
7. Norway	5·3	8·9	4·5	3·5	3·2
8. South America	—	—	0·4	2·9	4·1
9. Netherlands	3·7	2·1	2·8	2·5	2·5
10. Belgium	2·4	2·9	3·4	1·4	1·7
Average total value	13·69	19·54	28·96	35·82	44·10

SPECIAL EXPORTS [2]

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	1912
1. Wood	4·71	6·28	8·12	8·61	9·21	42·1	35·6	35·6	30·1	21·8
2. Wood pulp	0·08	0·57	1·88	3·27	5·22	0·6	3·2	8·2	11·4	12·4
3. Iron (pig, bar, blooms)	2·18	1·59	2·10	2·59	—	19·5	9·0	9·2	9·0	—
4. Butter	0·34	2·13	2·04	2·08	2·56	3·0	12·1	8·9	7·3	6·1
5. Iron ore	—	0·24	1·14	1·85	3·32	—	1·3	5·0	6·4	7·9
6. Paper	0·13	0·98[5]	1·07	1·62	2·24	1·1	5·5	4·7	5·7	5·3
7. Machinery	—	0·22	0·81	1·49	—	—	1·3	3·6	5·2	—
8. Iron and steel wares[6]	—	0·30	0·68	0·84	—	—	1·7	3·0	2·9	—
9. Matches	0·20	0·48	0·45	0·62	0·87	1·8	2·7	2·0	2·2	2·1
10. Fish, fresh and salted	—	0·77[5]	0·22	0·45	0·67	—	4·4	1·0	1·6	1·6
15. Oats	1·57	0·78	0·06	0·05	0·03	14·1	4·4	0·3	0·2	0·1
Average total value	11·18	17·65[5]	22·80	28·63	42·25					

Principal Countries.[3]	Percentages. '71–75	'91–95	'01–04	'06–10	1912
1. United Kingdom	52·9	44·1	38·2	33·7	29·3
2. Germany	7·0	13·4	16·6	20·6	22·5
3. Denmark and Iceland	10·9	12·2	13·8	10·0	8·9
4. France	9·3	8·8	7·2	7·4	7·0
5. Norway	3·5	5·3	6·1[7]	5·4	5·6
6. Russia and Finland	3·0	3·3	3·4	4·6	5·5
7. Netherlands	2·8	5·2	6·0	3·4	2·5
8. Belgium	4·4	3·4	3·8	2·7	2·5
9. Spain	1·1	1·3	1·0	1·4	1·4
10. Australia	—	0·2	0·2	1·0	1·1
Average total value	11·36	17·08	22·25[7]	28·63	42·26

[1] 'Official values' revised annually.
[2] Bullion and specie excluded for articles, included for countries.
[3] Countries of consignment from 1905, formerly countries of shipment.
[4] Excluding wheat.
[5] The diminution in the value of the exports for 1894 is stated to be largely owing to a revaluation of the units of value, value per 1,000 kg. of fish reduced from 207 kr. to 92 kr., of paper from 136 kr. to 25 kr.
[6] Including plates and wire.
[7] The exports to Norway are understated by about one million sterling annually, 1898–1901, owing to abrogation in 1898 of the special law regulating the trade between Sweden and Norway.

PORTUGAL[1]

SPECIAL IMPORTS,[2] EXCLUDING[3] BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.					Percentages of Total Value.					Principal Countries.	Percentages.				
	1871–75	'91–95	1901–05	'06–10	1912	'71–75	'91–95	'01–05	'06–10	1912		'71–75	'91–95	'01–05	'06–10	'11–15
1. Iron and steel manufactures	—	—	1·01	1·03	1·34	—	—	7·6	7·1	8·0	1. United Kingdom	52·9	28·6	29·7	28·2	
2. Raw cotton	0·12	0·49	0·91	0·98	1·18	1·7	5·9	6·9	6·8	7·0	2. Germany	2·1	11·9	16·3	16·0	
3. Coal	0·28	0·42	0·95	0·91	1·15	4·0	5·1	7·1	6·3	6·9	3. United States	4·7	16·9	8·7	10·0	
4. Wheat	0·35	1·01	0·69	0·91	0·69	5·0	12·2	5·2	6·3	4·1	4. France	13·2	11·1	9·8	9·7	
5. Cod	0·32	0·40	0·75	0·88	0·98	4·6	4·9	5·7	6·0	5·8	5. Spain	8·3	7·5	9·4	7·0	
6. Cottons	0·80	0·44	0·62	0·67	0·81	11·4	5·3	4·7	4·6	4·8	6. Argentina	—	0·2	1·7	3·9	
7. Sugar	0·43	0·43	0·53	0·57	0·60	6·1	5·2	4·0	3·9	3·6	7. Belgium	0·4	3·1	4·1	3·7	
8. Machinery and locomotives	—	—	0·38	0·47	0·60	—	—	2·8	3·2	3·6	8. Portuguese Poss.	2·4	2·7	2·8	3·2	
9. Cattle and pigs	0·21	0·19	0·40	0·38	0·28	3·0	2·2	3·0	2·6	1·7	9. Norway, Sweden	2·0	3·2	2·4	3·0	
10. Rice	—	0·15	0·31	0·37	0·39	—	1·9	2·3	2·6	2·3	10. Brazil	9·2	5·9	4·1	2·3	
11. Raw hides	0·18	0·16	0·28	0·26	0·34	2·6	1·9	2·1	1·8	2·0						
12. Raw wool	0·14	0·26	0·32	0·26	0·36	2·0	3·1	2·4	1·8	2·2						
13. Wool manufactures	0·40	0·25	0·26	0·24	0·20	5·7	3·0	2·0	1·7	1·2						
Average total value	6·96	8·29	13·27	14·55	16·79											

SPECIAL EXPORTS,[2] EXCLUDING[3] BULLION AND SPECIE

Principal Articles.	1871–75	'91–95	1901–05	'06–10	1912	'71–75	'91–95	'01–05	'06–10	1912	Principal Countries.	'71–75	'91–95	'01–05	'06–10	'11–15
1. Wine	2·12	2·56	2·26	2·33	2·80	40·6	47·2	34·1	33·1	36·3	1. United Kingdom	55·9	30·5	26·5	24·1	
2. Cork	0·23	0·68	0·77	0·87	0·93	4·5	12·6	11·6	12·4	12·0	2. Brazil	16·4	27·1	17·6	17·6	
3. Animals, excluding horses	0·38	0·22	0·54	0·57	0·68	7·4	4·0	8·2	8·2	8·8	3 Spain	6·8	7·8	16·7	16·7	
4. Sardines	0·03	0·24	0·36	0·46	0·68	0·6	4·4	5·4	6·6	8·8	4. Germany	2·9	8·9	7·5	8·2	
5. Cotton manufactures	—	0·11	0·30	0·35	0·21	—	2·1	4·5	5·0	2·7	5. Angola	—	4·8	7·3	8·0	
6. Horses, mules, asses	0·01	0·06	0·32	0·29	0·23	0·2	1·1	4·9	4·1	3·0	6. Mozambique	—	1·1	3·7	3·3	
7. Copper ore.	0·35	0·35	0·25	0·24	0·25	6·7	6·5	3·8	3·4	3·2	7. Belgium	0·9	2·8	2·7	3·2	
8. Olive oil	0·16	0·05	0·12	0·13	0·15	3·0	1·0	1·8	1·8	2·0	8. St. Thomas and					
9. Fruits	0·25	0·11	0·13	0·11	0·11	4·7	2·1	1·9	1·5	1·4	Prince's Is.	—	1·3	2·9	3·1	
10. Fish, excluding sardines	—	0·06	0·09	0·09	0·08	—	1·0	1·4	1·2	1·0	9. Russia	2·0	2·3	2·8	2·6	
11. Hides and skins	—	0·04	0·05	0·07	0·06	—	0·7	0·8	1·0	0·8	10. France	4·4	3·9	2·7	2·6	
12. Potatoes	—	0·04	0·06	0·05	0·04	—	0·7	0·9	0·7	0·5	11. United States	1·2	3·0	2·1	2·3	
13. Raw wool	0·08	0·04	0·04	0·03	0·03	1·5	0·7	0·6	0·5	0·4	12. Italy	0·9	0·7	1·1	1·6	
Average total value	5·21	5·41	6·62	7·02	7·72											

[1] Including Azores and Madeira.

[2] 'Declared values.'

[3] Bullion and specie is included before 1885.

SPAIN[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	1912	Principal Countries.	Percentages. '71–75	'85–89[2]	'01–05	'06–10	1912
1. Raw cotton	3·07	3·26	4·07	5·06	5·24	13·9	9·5	10·4	12·0	11·4	1. United Kingdom	34·1	15·7	18·7	18·2	17·6
2. Coal and coke	0·69	1·97	2·84	2·93	2·91	3·1	5·8	7·3	7·0	6·4	2. France	23·1	28·8	15·6	17·5	16·0
3. Machinery	0·31	1·21	2·39	2·50	3·80	1·4	3·5	6·1	5·9	8·3	3. United States	10·8	11·5	11·8	12·3	13·6
4. Chemicals	0·37	0·77	2·08	2·39	2·21	1·7	2·2	5·3	5·7	4·8	4. Germany	0·6	9·8	9·1	10·0	12·1
5. Timber & building materials	0·77	1·67	2·16	1·75	2·04	3·5	4·9	5·5	4·1	4·5	5. British posses-					
6. Wheat	—	1·91	2·65	1·69	0·37	—	5·6	6·8	4·0	0·8	sions in Asia	—	1·7	4·3	5·2	4·0
7. Fish, salted	0·70	1·04	1·19	1·42	1·63	3·1	3·0	3·0	3·4	3·6	6. Portugal	4·3	1·0	4·4	4·8	5·0
8. Iron & steel & manufactures	0·52	0·86	1·22	1·26	1·67	2·4	2·5	3·1	3·0	3·7	7. Russia (excluding					
9. Hides and skins, total	0·79	0·73	1·13	1·12	1·60	3·6	2·1	2·9	2·7	3·5	Finland	0·8	3·0	5·4	3·6	1·8
10. Coffee	—	0·57	0·81	0·90	1·04	—	1·7	2·1	2·1	2·3	8. Argentina	1·6	1·1	2·9	3·1	3·5
11. Tobacco, cigars, &c.	0·87	1·41	1·00	0·88	1·14	3·9	4·1	2·6	2·1	2·5	9. Belgium	2·0	3·5	3·6	2·8	2·9
12. Ships	0·64	0·47	0·34	0·65	0·85	2·9	1·4	0·9	1·5	1·9	10. Norway & Sweden	2·9	3·5	2·6	2·7	3·0
13. Cottons	0·25	0·34	0·29	0·50	0·45	1·1	1·0	0·8	1·2	1·0	11. Philippine Is.	1·3	2·9	1·6	1·7	1·7
14. Cacao	0·29	0·55	0·49	0·49	0·43	1·3	1·6	1·3	1·2	0·9	12. Switzerland	—	0·4	1·8	1·6	1·9
20. Woollens	0·44	0·69	0·41	0·31	0·27	2·0	2·0	1·1	0·7	0·6	Cuba	7·1	4·7	0·5	0·4	0·3
Average total value	22·16	34·27	39·07	42·23	45·63							22·16	32·11	39·07	42·23	45·63

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'91–95	1901–05	'06–10	1912	'71–75	'91–95	'01–05	'06–10	1912	Principal Countries.	'71–75	'85–89	'01–05	'06–10	1912
1. Iron ore	0·24	1·77	4·56	4·13	3·73	1·2	5·7	12·6	10·3	8·1	1. United Kingdom	38·6	23·4	33·7	27·8	
2. Lead	1·86	2·07	2·80	3·12	2·99	9·5	6·7	7·7	7·8	6·5	2. France	19·1	44·7	21·9	21·7	
3. Wine	6·26	6·03	2·68	2·82	4·55	31·9	19·4	7·4	7·1	9·9	3. Cuba	14·3	9·0	7·3	5·7	
4. Oranges	0·31	0·86	2·13	2·41	2·70	1·6	2·8	5·9	6·0	5·9	4. Germany	1·6	1·6	4·5	5·3	
5. Cottons	—	1·66	1·46	2·13	2·20	—	5·3	4·0	5·3	4·8	5. Netherlands	—	1·8	4·8	5·2	
6. Copper regulus	0·07	0·81	1·42	1·72	2·15	0·3	2·6	3·9	4·3	4·7	6. Argentina	3·4	2·5	2·1	5·0	
7. Cork	0·52	0·95	1·51	1·72	1·99	2·7	3·1	4·2	4·3	4·3	7. United States	4·5	2·2	2·8	4·9	
8. Copper ore	0·91	0·94	1·57	1·28	0·13	4·7	3·0	4·3	3·2	0·3	8. Portugal	6·7	3·8	4·7	4·7	
9. Olive oil	0·69	0·68	1·73	1·02	2·47	3·5	2·2	4·8	2·5	5·4	9. Italy	0·7	1·3	4·3	4·4	
10. Hides and skins (including											10. Belgium	1·2	1·6	2·9	3·2	
leather)	0·24	0·34	0·85	0·85	0·87	1·2	1·1	2·3	2·1	1·9	11. Mexico	—	0·8	1·4	1·6	
11. Almonds	0·19	0·42	0·72	0·81	0·64	1·0	1·4	2·0	2·0	1·4	12. Philippine Is.	0·4	0·7	1·4	1·0	
12. Raisins	1·07	0·68	0·85	0·66	0·38	5·4	2·2	2·3	1·6	0·8	Porto Rico	1·0	1·8	0·5	0·3	
13. Raw wool	0·30	0·42	0·67	0·65	0·61	1·5	1·4	1·9	1·6	1·3						
Average total value	19·60	31·03	36·30	39·95	45·84								30·46			

1 'Official values' revised annually.

2 From 1890 to 1896 countries of shipment are given instead of countries of consignment.

ITALY[1]

SPECIAL IMPORTS, INCLUDING[2] SILVER BULLION

Principal Articles.	Average Value in Millions Sterling.									Percentage of Total Value.								
	1871–75	'76–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1912	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
1. Raw cotton	2·08	2·12	3·58	3·90	4·12	4·75	7·38	11·06	13·66	4·4	4·4	6·9	7·0	8·9	8·5	9·9	9·4	9·2
2. Coal and coke	1·64	1·83	2·62	3·75	3·89	5·44	5·97	9·81	14·48	3·4	3·8	5·0	6·7	8·4	9·7	8·0	8·3	9·8
3. Wheat[3]	3·85	3·73	2·80	6·77	4·49	5·27	7·67	9·69	15·99	8·1	7·8	5·3	12·2	9·7	9·4[3]	10·3	8·2	10·8
4. Raw silk	—	—	—	2·41	3·43	4·62	7·30	8·34	6·41	—	—	—	4·3	7·4	8·3	9·8	7·1	4·3
Thrown undyed	*1·86*	*2·73*	*1·43*	*1·63*	*2·30*	*2·87*	*4·10*	*4·55*	*3·48*	*4·0*	*5·8*	*2·7*	*2·9*	*5·0*	*5·1*	*5·5*	*3·9*	*2·3*
5. Machinery and locomotives	—	0·85	1·55	1·66	1·16	1·99	3·08	7·93	5·99	—	1·8	3·0	3·0	2·5	3·6	4·1	6·7	4·0
6. Timber	0·98	1·35	1·35	1·84	1·08	1·60	2·55	4·96	5·54	2·1	2·8	2·6	3·3	2·3	2·9	3·4	4·2	3·7
7. Wool, raw and waste	0·99	1·29	1·26	1·14	1·05	1·51	2·30	3·29	4·19	2·1	2·7	2·4	2·0	2·3	2·7	3·1	2·8	2·8
8. Iron and steel	—	—	—	—	0·77	1·21	1·37	3·01	3·78	—	—	—	—	1·7	2·2	1·8	2·6	2·6
9. Fish	0·87	0·83	1·10	1·25	1·22	1·22	1·75	2·80	2·64	1·8	1·7	2·1	2·2	2·6	2·2	2·3	2·4	1·8
10. Raw hides	1·38	1·22	1·56	1·08	1·27	1·60	1·71	2·30	2·82	2·9	2·5	3·0	1·9	2·3	2·9	2·3	2·0	1·9
11. Woollens, pure	—	—	1·68	1·79	1·37	0·89	0·94	1·54	1·62	—	—	3·2	3·2	3·0	1·6	1·3	1·3	1·1
15. Coffee	1·13	1·16	1·11	1·10	1·23	0·72	0·68	0·99	1·93	2·4	2·4	2·1	2·0	2·7	1·3	0·9	0·8	1·3
19. Cottons, pure	2·92	2·24	2·16	1·58	0·82	0·24	0·20	0·38	0·52	6·2	4·7	4·1	2·8	1·8	0·4	0·3	0·3	0·3
20. Cotton yarn	1·45	1·25	1·09	0·47	0·19	0·15	0·21	0·27	0·32	3·0	2·6	2·1	0·9	0·4	0·3	0·3	0·2	0·2
Average total value	47·26	47·53	52·26	55·59	46·19	54·94	74·68	117·75	148·08									
SPECIAL EXPORTS, INCLUDING[2] SILVER BULLION																		
1. Silk, raw and waste	13·51	11·52	11·89	12·15	11·97	14·14	19·05	21·13	17·29	31·4	27·1	26·9	31·8	30·8	28·9	31·0	27·6	18·0
2. Cottons	—	—	—	—	0·56	1·44	2·75	4·54	6·38	—	—	—	—	1·4	2·9	4·5	5·9	6·6
3. Silks and half silks	—	—	—	0·71	0·85	1·75	2·78	3·24	3·61	—	—	—	1·9	2·2	3·6	4·5	4·2	3·8
4. Butter and cheese	—	—	—	0·65	0·86	1·09	1·47	2·27	3·25	—	—	—	1·7	2·2	2·2	2·4	3·0	3·4
5. Olive oil	4·35	4·29	3·30	2·66	2·24	1·83	1·57	2·05	2·07	10·1	10·1	7·5	7·0	5·8	3·7	2·6	2·7	2·2
6. Wine, in casks	0·70	1·10	2·53	2·62	1·87	2·37	1·89	2·01	1·67	1·6	2·6	5·7	6·9	4·8	4·8	3·1	2·6	1·7
7. Eggs	0·24	1·10	1·34	0·91	1·19	1·55	1·84	1·87	1·94	0·5	2·6	3·0	2·4	3·1	3·2	3·0	2·4	2·0
8. Raw hemp and flax	1·21	1·16	1·08	0·99	1·25	1·57	1·62	1·84	2·07	2·8	2·7	2·4	2·6	3·2	3·2	2·6	2·4	2·2
9. Oranges and lemons	1·00	1·11	1·24	1·32	1·18	1·02	1·05	1·43	2·52	2·3	2·6	2·8	3·5	3·0	2·1	1·7	1·9	2·6
10. Raw hides and skins	—	0·26	0·42	0·50	0·62	0·74	0·91	1·42	1·92	—	0·6	1·0	1·3	1·6	1·5	1·5	1·9	2·0
11. Sulphur	1·10	1·09	1·17	0·95	1·01	1·55	1·73	1·32	1·56	2·5	2·5	2·6	2·5	2·6	3·2	2·8	1·7	1·6
12. Almonds	0·37	0·43	0·49	0·50	0·71	0·75	1·01	1·24	2·06	0·9	1·0	1·1	1·3	1·8	1·5	1·6	1·6	2·2
14. Rice	0·97	1·02	1·10	0·39	0·45	0·49	0·68	0·89	1·41	2·2	2·4	2·5	1·0	1·2	1·0	1·1	1·2	1·5
18. Coral, manufactured	—	1·63	2·17	0·76	0·84	1·03	1·06	0·65	0·78	—	3·8	4·9	2·0	2·2	2·1	1·7	0·8	0·8
Average total value	42·95	42·53	46·21	38·17	38·91	48·94	61·54	76·44	95·88									

[1] 'Official values' revised annually.

[2] First two periods excluding silver.

[3] Including temporary imports after 1896.

ITALY

COUNTRIES[1] OF ORIGIN AND DESTINATION

From	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
	Percentages of Total Value.								
1. Germany	2·0	3·9	7·1	10·2	12·3	12·1	12·9	16·8	16·9
2. United Kingdom	24·5	22·5	22·5	20·4	21·6	19·5	16·2	16·6	15·6
3. United States and Canada	4·0	4·8	4·6	4·9	8·3	11·6	12·2 / 0·1	12·7 / 0·2	13·9 / 0·4
4. France	28·2	27·1	26·1	19·2	13·3	10·4	10·5	9·8	7·8
5. Austria-Hungary	18·6	17·8	15·2	12·8	10·6	10·7	9·8	9·4	8·0
6. Russia	4·0	5·0	3·5	8·4	9·0	9·3	9·7	6·5	5·8
7. British E. Indies	—	3·9	5·5	6·6	6·3	4·7	5·1	4·6	4·2
8. Switzerland	3·7	2·7	4·3	4·8	4·1	3·3	3·2	2·7	2·3
9. Belgium	1·1	1·0	1·7	2·5	2·3	2·3	2·1	2·7	2·3
10. Argentina	—	—	—	0·9	1·7	2·1	2·0	2·5	4·1
11. China and Hong-Kong	—	—	—	—	0·9	2·9	4·0	2·4	1·5
12. Roumania	—	—	—	—	0·8	2·1	2·9	2·1	4·6
Average value in millions sterling	47·66	48·33	55·81	58·09	46·19	55·94	74·68	117·7	148·1

To	'71–75	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	1912
	Percentages of Total Value.								
Switzerland	13·1	11·2	11·1	16·1	18·5	16·3	17·5	15·3	9·1
Germany	1·3	2·9	7·7	10·9	15·1	16·2	14·9	14·7	13·7
United States and Canada	2·7	3·7	4·8	6·6	9·2	8·7	11·7	12·7	10·9 / 0·3
France	38·1	44·6	42·8	31·3	14·9	12·8	11·6	10·9	9·3
United Kingdom	12·2	9·8	7·5	9·7	11·7	10·5	9·0	8·4	11·0
Austria-Hungary	19·3	16·3	11·2	9·3	11·5	11·5	9·0	8·0	9·1
Argentina	—	—	—	3·0	3·1	5·1	5·7	7·7	7·6
Turkey in Europe	0·8	1·1	1·4	1·1	1·8	2·1	3·0	3·5	0·7
Egypt	1·3	0·9	1·5	1·0	1·1	1·9	2·5	2·7	1·8
Belgium	0·5	0·7	1·4	2·5	2·2	1·8	2·0	2·6	3·1
British East Indies	—	1·5	1·8	1·4	1·6	2·0	2·0	1·3	1·9
Russia in Europe	2·2	2·1	2·0	1·3	1·2	1·0	0·8	1·2	2·3
Average value in millions sterling	43·24	43·64	46·23	40·99	38·91	48·94	61·54	76·44	95·88

An analysis of the trade through the St. Gothard tunnel throws much light on the relations between Italy and central Europe. In 1907 the total amount of goods carried through the tunnel was 1,143 thousand metric tons, of which 770 thousand were carried to Italy and 373 thousand from Italy. Of the traffic that passed by that route into Italy 676 thousand tons came from Germany and beyond, only 94,000 tons originating in Switzerland. As coal and lignite (272 thousand tons) and iron and steel manufactures (212 thousand tons) were the two principal classes of commodities carried through the tunnel, there cannot be a doubt that those two account for the larger proportion of the goods coming by this route from Germany and beyond. Next to the two classes of commodities mentioned, grain, malt, and clover were carried in greater quantity than any others (178 thousand tons), and these without doubt made up a very large proportion of the goods that were transported in the opposite direction and did not pass beyond Switzerland —206 out of the total of 373 thousand tons going in that direction. The grain must be almost entirely of external origin, and this trade would no doubt have grown more rapidly but for the difficulty of communication between Genoa and the interior mentioned in par. **984**. In 1912 carriages and parts thereof formed the chief consignment from Italy to the United Kingdom (£1·08 million as against £0·92 million silks), but they arrived almost entirely through non-Italian ports. The large number of wealthy foreigners who reside for longer or shorter periods in Italy must contribute a great deal to account for the large Italian excess of imports.

[1] Including bullion and specie to 1890, thereafter silver bullion only.

ROUMANIA

GENERAL IMPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1887–90	'91–95	1901–05	'06–10	Percentages of Total Value. '87–90	'91–95	'01–05	'06–10
1. Iron and steel	—	—	1·07	2·39	—	—	9·0	14·6
2. Cotton manufactures	—	—	1·87	1·61	—	—	15·7	9·9
" piece goods.	1·48	1·63	1·59	—	10·9	10·3	13·3	—
3. Machinery	0·52	0·75	0·82	1·54	3·8	4·7	6·8	9·4
4. Woollens [2]	—	—	1·26	1·11	—	—	10·5	6·8
" [3]	1·67	1·46	1·12	—	12·3	9·2	9·4	—
5. Cotton yarn	—	—	0·55	0·90	—	—	4·6	5·5
" " undyed	0·48	0·43	0·38	—	3·5	2·7	3·2	—
6. Vehicles	—	—	0·06	0·55	—	—	0·5	3·4
7. Silk manufactures	—	—	0·28	0·45	—	—	2·3	2·8
Silks and mixed tissues	—	0·30	0·20	—	—	2·0	1·7	—
8. Coal and coke	0·19	0·45	0·20	0·32	1·4	2·9	1·7	1·9
Average total value	13·56	15·80	11·96	16·36				

Principal Countries.	Percentages. '86–90	'91–95	'01–05	'06–10
1. Germany	28·1	28·8	28·5	33·9
2. Austria-Hungary	18·2	23·9	27·1	24·6
3. United Kingdom	26·8	22·1	16·8	15·4
4. France	8·5	8·5	5·8	5·5
5. Italy	1·2	1·8	5·8	4·9
6. Turkish Empire	3·0	3·6	3·6	3·7
7. Belgium, including Egypt	5·2	5·0	2·0	3·1
8. Russia	2·7	2·6	2·6	2·7
9. Switzerland	4·1	1·7	1·9	1·8
10. Netherlands	1·0	0·3	1·7	1·3

GENERAL EXPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1887–90	'91–95	1901–05	'06–10	Percentages of Total Value. '87–90	'91–95	'01–05	'06–10
1. Wheat	4·40	4·95	5·30	8·70	41·4	41·5	36·7	43·4
2. Maize	2·24	2·75	2·58	4·03	21·1	23·1	17·9	20·1
3. Barley and malt	0·64	1·06	1·21	1·59	6·0	8·9	8·4	7·9
4. Petroleum	0·07	0·07	0·49 [4]	1·23	0·6	0·6	3·4	6·2
5. Oil-seeds	0·60	0·60	0·90	—	5·6	5·0	6·2	—
6. Building wood	0·12	0·12	0·47	0·91	1·2	1·0	3·3	4·5
7. Oats	—	—	0·65	0·62	—	—	4·5	3·1
8. Rye	0·68	0·57	0·53	0·56	6·4	4·8	3·7	2·8
9. Wheat flour	—	0·30	0·23	0·40	—	2·5	1·6	2·0
10. Haricots	—	—	0·20	0·32	—	—	1·4	1·6
11. Eggs	—	—	0·16	0·13	—	—	1·1	0·7
Average total value	10·63	11·92	14·43	20·05				

Principal Countries.	Percentages. '86–90	'91–95	'01–05	'06–10
1. Belgium	10·8	19·5	42·6	29·5
2. Netherlands	1·8	1·0	9·6	14·2
3. Italy	5·9	3·7	7·4	10·9
4. United Kingdom	54·0	33·5	8·5	9·9
5. Austria-Hungary	7·2	11·9	13·1	9·7
6. France	7·4	3·0	3·3	6·5
7. Germany	3·5	18·8	7·1	6·2
8. Turkish Empire, including Egypt	3·3	4·5	2·9	6·0
9. Russia	2·6	1·8	1·6	1·1
10. Bulgaria	1·6	1·2	1·2	0·8

[1] 'Official values' revised in 1895, 1902, 1904, and 1905. Since 1905, cereals have been revised quarterly and other articles annually.
[2] New classification. [3] Old classification. [4] Over one-third due to over-valuation of benzine in 1902.

SERVIA[1]

SPECIAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling. '03–05	'06–10	1912	Percentages. '03–05	'06–10	1912
1. Iron and steel wares	189	381	476	8·1	13·6	11·2
2. Cottons	208	265	350	8·9	9·5	8·2
3. Cotton yarns	177	230	314	7·6	8·3	7·4
4. Hides and leather	175	199	238	7·5	7·1	5·6
5. Machinery	93	151	319	4·0	5·4	7·5
6. Woollens	112	141	161	4·8	5·0	3·8
7. Chemicals and drugs	—	97	170	—	3·5	4·0
8. Paper	57	80	87	2·4	2·9	2·0
9. Salt	32	50	83	1·4	1·8	1·9
11. Wool yarn	36	43	52	1·6	1·5	1·2
12. Sugar, total	85	42	31	3·6	1·5	0·7
Average total value	2,330	2,790	4,244			

SPECIAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	'03–05	'06–10	1912	'03–05	'06–10	1912
1. Wheat	420	641	699	16·2	19·0	20·7
2. Maize	35	448	296	1·3	13·3	8·8
3. Prunes	379	407	71	14·6	12·0	2·1
4. Barley	50	183	87	1·9	5·4	2·6
5. Cattle	443	165	3	17·1	4·9	0·1
6. Hides and skins	97	147	10	3·7	4·4	0·3
7. Meat, fresh and salted	103	144	611	4·0	4·3	18·1
8. Swine	594	101	5	22·9	3·0	0·1
9. Fresh fruit	62	78	8	2·4	2·3	0·2
Average total value	2,588	3,378	3,369			

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'01–05	'06–10	1912	To	'01–05	'06–10	1912
1. Germany	13·3	33·0	29·3	1. Austria-Hung.	85·7	26·4	42·8
2. Austria-Hung.	58·3	32·7	44·9	2. Germany	5·2	24·5	21·7
3. Utd. Kingdom	9·1	12·2	8·0	Turkey	2·8	15·7	8·5
4. Turkey	3·8	5·5	2·6	Belgium	1·2	14·6	5·0
5. France	2·6	3·5	3·5	Roumania	1·6	3·6	6·5
6. Italy	1·8	3·3	3·2	Bulgaria	1·3	3·6	1·9

BULGARIA[2]

GENERAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling. '87–90	'01–05	'06–10	Percentages. '87–90	'01–05	'06–10
1. Cottons	374	486	567	13·0	12·8	10·1
2. Iron and manufactures	200	212	442	6·9	5·6	7·9
3. Cotton yarn	313	292	410	10·8	7·7	7·3
4. Machinery	—	132	380	—	3·5	6·8
5. Wool manufactures	124	130	182	4·3	3·4	3·2
6. Wood	78	80	156	2·7	2·1	2·8
7. Sugar, refined	*146*[3]	139	135	5·1	3·7	2·4
8. Petroleum, refined	73[3]	105	132	2·5	2·8	2·4
9. Hides, raw	—	66	116	—	1·7	2·1
Average total value	2,885	3,800	5,609			

GENERAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	'87–90	'01–05	'06–10	'87–90	'01–05	'06–10
1. Wheat	1414	1800	1439	54·1	37·5	30·3
2. Maize	211	694	682	8·1	14·5	14·4
3. Eggs	—	280	380	—	5·8	8·0
4. Flour, all kinds	26	132	269	1·0	2·8	5·7
5. Rye	78	183	206	3·0	3·8	4·4
6. Essence of rose	—	120	194	—	2·5	4·1
7. Barley	43	255	185	1·7	5·3	3·9
8. Sheep	112	121	151	4·3	2·5	3·2
9. Hides and skins	52	125	144	2·0	2·6	3·0
10. Haricots	—	58	127	—	1·2	2·7
Average total value	2,616	4,801	4,744			

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'86–90	'01–05	'06–10	To	'86–90	'01–05	'06–10
1. Austria-Hung.	30·1	27·2	26·3	Turkey	43·1	19·5	27·6
2. Germany	4·9	14·8	17·1	Germany	0·9	25·2	18·5
3. Utd. Kingdom	28·6	17·5	16·2	Belgium	0·8	8·8	12·1
4. Turkey	14·4	14·2	13·8	Utd. Kingdom	15·5	16·4	11·6
5. France	5·3	6·1	6·5	Austria-Hungary	5·8	9·7	7·1
6. Italy	1·7	6·5	4·0	Greece	1·2	3·5	6·3
7. Belgium	2·1	2·5	4·0	France	21·7	6·1	6·1
8. Russia	5·6	4·2	4·0	Italy	2·1	3·0	2·6

[1] 'Declared values.'

[2] Declared values c.i.f. to frontier.

[3] Raw and refined.

GREECE [1]

SPECIAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentages of Total Value.				Principal Countries.	Percentages.		
	1871–75	'92–95	1901–05	'06–10	'71–75	'92–95	'01–05	'06–10		'91–95	'01–05	'06–10
1. Grain	0·90	1·08	1·31	1·47	25·2	25·1	23·6	24·6	1. United Kingdom	28·2	21·1	21·5
2. Cottons	0·34	0·35	0·40	0·42	9·4	8·1	7·2	7·0	2. Russia	20·4	21·3	18·3
3. Coal	0·11	0·32	0·30	0·40	3·2	7·3	5·4	6·7	3. Austria-Hungary	13·2	14·0	12·2
4. Fish	—	0·17	0·20	0·28	—	4·0	3·6	4·7	4. Germany	7·3	8·8	9·3
5. Wool manufactures	0·17	0·22	0·18	0·21	4·6	5·2	3·2	3·4	5. Turkish Empire	13·5	10·1	8·5
6. Animals	0·09	0·11	0·21	0·17	2·6	2·6	3·8	2·9	6. France	7·9	8·3	6·9
7. Paper and manufactures	—	0·08	0·12	0·16	—	1·9	2·2	2·6	7. Bulgaria	—	—	6·1
8. Wood for building	0·10	0·12	0·21	0·15	2·8	2·8	3·8	2·6	8. Italy	2·8	4·3	4·2
9. Hides and skins, raw	0·27	0·15	0·16	0·14	7·6	3·4	2·9	2·4	9. United States	2·6	1·8	3·7
10. Coffee	0·07	0·10	0·12	0·12	2·0	2·3	2·2	1·9	10. Belgium	1·8	2·0	2·0
11. Sugar	0·17	0·12	0·12	0·10	4·8	2·9	2·1	1·7				
12. Iron and steel	0·08	0·05	0·09	0·09	2·3	1·1	1·6	1·5				
13. Raw cotton	—	0·02	0·07	0·09	—	0·5	1·3	1·5				
Average total value	3·59	4·30	5·55	5·97					Average total value	4·57	5·55	5·97

SPECIAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'92–95	1901–05	'06–10	'71–75	'92–95	'01–05	'06–10	Principal Countries.	'91–95	'01–05	'06–10
1. Currants	1·19	1·32	1·20	1·48	51·4	41·6	34·6	30·9	1. United Kingdom	37·1	26·8	26·0
2. Olive oil	0·26	0·15	0·16	0·42	11·2	4·7	4·6	8·8	2. Austria-Hungary	8·2	10·7	9·6
3. Wine in casks	0·04	0·17	0·25	0·39	1·9	5·3	7·2	8·1	3. Germany	4·2	7·5	9·5
4. Silver-lead ore	0·16	0·35	0·33	0·33	6·7	11·1	9·5	6·9	4. France	16·9	10·4	8·4
5. Tobacco leaf	0·04	0·09	0·22	0·33	1·7	2·8	6·3	6·9	5. Netherlands	4·1	8·4	8·3
6. Manganese iron ore	—	0·10	0·14	0·23	—	3·2	4·0	4·8	6. United States	4·5	5·8	7·6
7. Figs	0·11	0·11	0·13	0·17	5·0	3·4	3·7	3·5	7. Italy	4·3	4·9	7·1
8. Zinc ore	—	0·15	0·08	0·16	—	4·6	2·3	3·3	8. Egypt	1·3	5·8	7·1
9. Olives	—	0·04	0·05	0·14	—	1·3	1·4	3·0	9. Turkish Empire	7·3	6·6	5·1
10. Valonia	0·05	0·06	0·09	0·08	2·3	1·8	2·6	1·7	10. Belgium	6·5	6·3	4·7
11. Sponges	—	0·07	0·03	0·04	—	2·3	0·9	0·9				
Average total value	2·31	3·17	3·47	4·78					Average total value	3·39	3·47	4·78

[1] 'Official values'; those for 1900–10 based on the average prices in 1899, and for 1890–98 on the prices in 1889.

EGYPT

SPECIAL IMPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1881–85	'91–95	1901–05	'06–10	'11–13	Percentages of Total Value. '81–85	'91–95	'01–05	'06–10	'11–13
1. Cottons	1·63	1·48	2·69	3·28	3·86	19·9	16·2	14·7	13·2	14·0
2. Flour, wheat, and maize	0·07	0·14	0·64	1·49	1·82	0·9	1·5	3·5	6·0	6·6
3. Iron and steel manfrs.	—	—	0·96	1·36	1·54	—	—	5·3	5·5	5·6
4. Building wood	—	0·47	1·04	1·29	1·22	3·8	5·2	5·7	5·2	4·4
5. Coal	0·41	0·49	0·94	1·29	1·68	5·0	5·4	5·2	5·2	6·1
6. Tobacco	—	—	0·65	0·88	1·19	—	—	3·6	3·5	4·3
7. Machinery and locomotives	0·17	—	0·68	0·85	0·91	2·0	—	3·7	3·4	3·3
8. Linen manufactures	—	0·25	0·51	0·68	0·70	—	2·7	2·8	2·7	2·5
9. Woollens	0·27	—	0·35	0·45	0·51	3·3		1·9	1·8	1·9
10. Rice	0·09	0·13	0·33	0·40	0·41	1·1	1·4	1·8	1·6	1·5
11. Petroleum	0·14	0·15	0·23	0·33	0·40	1·7	1·6	1·3	1·3	1·5
13. Coffee	0·23	0·29	0·22	0·32	0·44	2·8	3·2	1·2	1·3	1·6
22. Indigo	0·27	0·21	0·18	0·12	0·10	3·3	2·3	1·0	0·5	0·4
Average total value	8·20	9·17	18·25	24·83	27·59					

Principal Countries.	Percentages of Total Value. '82–85	'91–95	'01–05	'06–10
1. United Kingdom, including Mediterranean ports	40·0	35·1	35·6	32·8
2. Turkey	18·2	20·1	14·1	12·2
3. France and Algeria	13·0	10·3	9·8	12·1
4. Austria-Hungary	11·9	8·4	7·2	7·0
5. Germany	—	2·2	4·3	5·1
6. Italy	3·6	3·4	5·4	4·9
7. British East Indies	—	6·1	4·9	4·1
8. Belgium	—	3·5	3·5	3·7
9. Russia	3·2	4·1	3·7	2·9
10. Sweden (and Norway)	—	1·3	1·9	2·0
11. China, Japan, &c.	—	0·9	1·3	1·7
Average total value	8·16	9·17	18·25	24·83

SPECIAL EXPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1881–85	'91–95	1901–05	'06–10	'11–13	Percentages of Total Value. '81–85	'91–95	'01–05	'06–10	'11–13
1. Raw cotton	8·27	9·03	15·15	21·94	26·00	66·2	68·2	77·8	82·8	80·4
2. Cotton seed	1·51	1·63	1·76	2·42	3·56	12·1	12·3	9·0	9·1	11·0
3. Cigarettes[2]	—	—	0·48	0·40	0·42	—	—	2·5	1·5	1·3
4. Oil-cake	—	0·04	0·20	0·24	0·35	—	0·3	1·0	0·9	1·1
5. Onions	—	0·14	0·22	0·23	0·33	—	1·0	1·1	0·9	1·0
6. Hides and skins	0·15	0·09	0·10	0·18	0·21	1·2	0·7	0·5	0·7	0·6
7. Rice	0·14	—	0·12	0·18	0·29	1·1	—	0·6	0·7	0·9
8. Eggs	—	—	0·10	0·12	0·19	—	—	0·5	0·4	0·6
10. Gums	0·15	—	0·23	0·08	0·06	1·2	—	1·2	0·3	0·2
11. Sugar	0·46	0·64	0·39	0·06	0·15	3·7	4·9	2·0	0·2	0·5
13. Beans	0·74	0·71	0·22	0·03	0·05	5·9	5·3	1·1	0·1	0·1
15. Wheat	0·35	0·21	0·02	0·02	0·01	2·8	1·6	0·1	0·1	0·0
Average total value	12·49	13·24	19·48	26·52	32·33					

Principal Countries.	Percentages of Total Value. '82–85	'91–95	'01–05	'06–10
1. United Kingdom, including Mediterranean ports	66·5	58·8	51·8	52·1
2. Germany	—	2·2	7·8	9·1
3. France and Algeria	8·6	7·8	8·1	8·3
4. America	0·2	2·0	5·3	6·7
5. Russia	7·0	12·7	7·2	5·8
6. Austria-Hungary	5·1	4·2	4·5	4·9
7. Switzerland	—	2·2	3·7	3·3
8. Italy	6·8	0·5	3·7	3·0
9. Turkey	3·2	0·3	1·9	1·7
10. Spain	—	1·6	2·4	1·7
11. China, Japan, &c.	—	0·1	1·1	1·5
Average total value	12·24	13·24	19·48	26·52

The values of the imports are partly 'declared values,' partly 'official values'; those of the exports are in the main 'official values' periodically fixed at 10 per cent. below the real values.

[1] Totals from 1902 include military stores.

[2] Exports from 1900 include cigarettes manufactured from imported tobacco.

CHINA [1]

SPECIAL [2] IMPORTS [3] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1876–80	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '76–80	'91–95	'01–05	'06–10	1912
1. Cotton manufactures	5·90	10·09	18·68	18·94	21·99	26·9	34·0	38·9	30·9	30·5
Yarn and thread	*0·88*	*4·08*	*8·39*	*8·56*	*9·56*	*4·0*	*13·7*	*17·5*	*14·0*	*13·2*
2. Opium	9·32	5·85	5·14	5·33	7·28	42·4	19·9	10·8	8·9	10·1
3. Sugar and candy	—	1·03	2·56	3·67	3·65	—	3·8	5·4	6·0	5·1
4. Rice	—	1·91	1·51	3·45	1·78	—	6·7	3·1	5·7	2·5
5. Kerosene	0·09	1·14	2·47	2·98	3·79	0·4	3·9	5·1	5·0	5·3
6. Metals, all kinds	1·20	1·43	2·95	2·85	2·78	5·4	4·8	6·1	4·7	3·9
7. Fish, &c.	—	0·57	0·77	1·21	1·61	—	2·0	1·6	2·0	2·2
8. Coal and coke	0·28	0·47	1·06	1·20	1·25	1·3	1·6	2·2	2·0	1·7
9. Machinery	—	0·22	0·35	1·02	0·88	—	0·8	0·7	1·7	1·2
10. Flour	—	0·18	0·53	1·01	1·94	—	0·6	1·1	1·6	2·7
11. Wool yarn and manufrs.	1·45	0·86	0·67	0·90	1·20	6·6	2·8	1·4	1·5	1·7
12. Cigars	—	—	0·42	0·83	1·39	—	—	0·9	1·4	1·9
13. Matches	0·11	0·31	0·59	0·75	1·07	0·5	1·1	1·2	1·2	1·5
14. Timber	—	0·21	0·23	0·72	0·38	—	0·7	0·7	1·2	0·5
Average total value	21·98	29·23	48·09	60·89	72·20					

Principal Countries.	Percentages. '76–80	'91–95	'01–05	'06–10	1912
1. Hong-Kong	36·7	50·4	38·6	35·6	30·4
2. United Kingdom	25·3	19·5	16·7	16·9	15·4
3. Japan, including Formosa from 1895	4·5	6·0	13·1	14·2	18·7
4. India	26·5	10·4	9·3	8·3	9·6
5. United States	2·0	4·3	10·6	8·3	7·5
6. Europe, ex. Rus. and U.K.	1·7	3·6	6·4	8·0	7·7
Germany	—	—	—	*3·9*	*4·4*
Belgium	—	—	—	*2·5*	*1·8*
7. Russian Empire	—	0·6	0·8	1·9	4·4
8. Dutch East Indies	—	0·0	0·9	1·4	1·2
9. Macão	—	2·1	0·7	1·4	1·3
10. Straits Settlements	1·1	1·4	1·1	1·4	1·8
11. French Ind.-China	0·5	0·5	0·4	1·2	0·7
Average total value	22·70	29·89	49·69	62·97	74·12

SPECIAL EXPORTS, [4] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1876–80	'91–95	1901–05	'06–10	1912	Percentages of Total Value. '76–80	'91–95	'01–05	'06–10	1912
1. Silk	8·32	8·00	10·19	12·47	14·28	38·8	34·9	34·1	28·9	25·3
Steam filature from 1894	—	*1·10*	*3·98*	*5·15*	*5·25*	—	—	*11·9*	*13·4*	*9·3*
Piece goods	*1·33*	*1·60*	*1·55*	*2·06*	*2·46*	*6·2*	*7·1*	*5·2*	*4·8*	*4·3*
2. Tea	10·02	5·94	3·45	4·62	5·15	46·8	25·7	11·5	10·7	9·1
3. Beans and bean cake	—	0·30	1·56	3·70	6·26	—	1·3	5·2	9·0	11·1
4. Raw cotton	0·07	1·26	1·91	2·34	2·60	0·3	5·7	6·4	5·4	4·6
5. Furs and manufactures	—	0·29	0·90	1·16	0·98	—	1·3	3·0	2·7	1·7
6. Straw braid	0·23	0·43	0·63	1·13	1·17	1·1	1·9	2·1	2·6	2·1
7. Hides	0·08	0·15	0·76	1·11	1·34	0·4	0·7	2·5	2·6	2·4
8. Vegetable oil	—	0·12	0·49	0·96	2·16	—	0·6	1·6	2·3	3·8
9. Provisions, vegetables	—	0·17	0·37	0·81	1·83	—	0·7	1·2	1·9	3·2
10. Wool	—	0·32	0·55	0·79	1·05	—	1·4	1·8	1·8	1·9
11. Matting mats	0·10	0·31	0·59	0·64	0·58	0·5	1·3	2·0	1·5	1·0
12. Firecrackers	0·07	0·26	0·33	0·58	0·49	0·3	1·2	1·1	1·3	0·9
Average total value	21·41	22·81	29·97	42·82	56·54					

Principal Countries.	Percentages. '76–80	'91–95	'01–05	'06–10	1912
1. Hong-Kong	21·3	39·3	38·6	31·9	27·9
2. Europe, ex. Rus. and U.K.	13·8	14·9	17·3	29·9	21·9
France	—	—	—	*11·0*	*10·5*
Germany	—	—	—	*2·7*	*3·9*
Belgium	—	—	—	*1·5*	*1·8*
3. Japan	2·7	8·0	14·0	14·9	14·9
4. Russian Empire	5·7	9·6	4·5	10·1	12·2
5. United States	10·9	10·7	10·8	9·4	9·5
6. United Kingdom	39·6	9·8	5·8	5·1	4·3
7. Macão	—	1·5	2·3	1·5	1·2
8. Straits Settlements	1·2	1·4	1·6	1·5	1·7
9. India	0·8	1·9	1·2	1·2	2·0

Rate of Conversion of the tael (*in pence*).

Years	0	1	2	3	4	5	6	7	8	9
1890 +	62¼	59	52¼	47¼	38⅜	39¼	40	35¾	34⅝	36⅛
1900 +	37¼	35 9/16	31·2	31⅔	34·4	36·1	39½	39	32	31 3/16
1910 +	32 5/16	32¼	36⅝							

[1] Exclusive of Hong-Kong; including trade in junks from 1887.
[2] General imports for countries.
[3] Values based on 'market values' in Chinese port, including import duty prior to 1904, c.i.f. values from 1904.
[4] Values based on 'market values' in Chinese port, excluding import duty prior to 1904, f.o.b. values from 1904.

JAPAN [1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1891–95	'96–00	1901–05	'06–10	1912	Percentages of Total Value. '91–95	'96–00	'01–05	'06–10	1912
1. Raw cotton	1·85	4·96	7·92	11·21	20·31	16·4	19·4	22·1	24·2	31·3
2. Iron, steel, and manufrs.	0·79	2·05	2·68	4·55	8·07	7·0	8·0	7·5	9·8	12·5
3. Machinery and locomotives	—	1·01	1·40	2·61	3·21	—	3·7	3·9	5·6	4·9
4. Oil-cake	0·09	0·49	0·93	2·16	3·02	0·8	1·9	2·6	4·7	4·7
5. Rice	0·54	1·95	3·92	2·09	3·20	4·7	7·7	10·9	4·5	4·9
6. Sugar	1·35	2·23	2·18	1·83	1·65	11·5	8·7	6·1	4·0	2·5
7. Cottons	0·68	1·39	1·40	1·83	1·10	5·9	5·4	3·9	3·9	1·7
8. Wool and yarn	0·13	0·38	0·65	1·56	2·52	1·2	1·5	1·8	3·4	3·9
9. Kerosene	0·55	0·97	1·55	1·45	1·34	4·6	3·8	4·3	3·1	2·1
10. Woollens	0·68	1·15	0·93	1·23	—	5·9	4·5	2·6	2·7	—
11. Beans and pulse	0·35	0·63	0·80	1·13	1·08	2·9	2·5	2·2	2·4	1·7
16. Cotton yarn	0·91	0·90	0·24	0·23	0·11	7·6	3·5	0·7	0·5	0·2
Average total value	11·51	25·53	35·92	46·40	64·83					

Principal Countries.	Percentages. '81–85	'96–00	'01–05	'06–10	1912
1. United Kingdom	48·1	25·0	19·8	22·8	18·7
2. British East Indies	8·0	13·1	19·0	16·6	22·2
3. China	18·3	14·0	14·1	15·7	13·9
4. United States	9·4	15·2	17·4	15·1	20·2
5. Germany	5·2	8·8	8·7	9·9	9·7
6. Korea	—	2·6	2·3	2·7	—
7. Belgium	—	1·9	2·1	2·1	1·4
8. French Indies	—	4·0	3·0	1·6	1·7
9. France	6·6	2·7	1·3	1·2	0·9
10. Australia	—	0·6	0·9	1·1	2·0
Average total value in millions sterling	5·82	25·59	35·98	46·58	

SPECIAL EXPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1891–95	'96–00	1901–05	'06–10	1912	Percentages of Total Value. '91–95	'96–00	'01–05	'06–10	1912
1. Raw silk	4·54	4·81	7·89	12·06	15·35	35·8	25·6	26·1	27·6	27·9
10. Silk waste and knubs	0·37	0·34	0·59	0·72	1·08	1·9	1·8	1·9	1·6	2·0
2. Silks	1·16	1·77	3·53	3·76	3·57	9·5	9·4	11·7	8·6	6·5
3. Cotton yarn	0·04	1·78	2·76	3·34	5·48	0·4	9·5	9·1	7·6	9·9
4. Copper	0·62	0·88	1·39	2·40	2·54	4·8	4·7	4·6	5·5	4·6
5. Cottons	0·22	0·47	0·92	1·97	2·88	1·9	2·5	3·0	4·5	5·2
6. Tea	0·99	1·43	1·73	1·83	2·06	7·7	7·6	5·7	4·2	3·7
7. Coal	0·71	1·46	1·72	1·79	2·08	5·6	7·8	5·7	4·1	3·8
8. Matches	0·39	0·59	0·90	1·06	1·24	3·2	3·1	3·0	2·4	2·3
9. Bamboo and wood	0·05	0·14	0·36	0·98	0·82	0·4	0·7	1·2	2·2	1·5
11. Porcelain and earthenware	0·20	0·22	0·37	0·63	0·56	1·5	1·1	1·2	1·4	1·0
12. Camphor	0·18	0·33	0·55	0·65	0·74	1·3	1·8	1·8	1·5	1·3
13. Fish and shell-fish	0·31	0·29	0·49	0·58	0·76	2·4	1·5	1·6	1·3	1·4
14. Matting	0·21	0·36	0·55	0·53	0·39	1·8	1·9	1·8	1·2	0·7
15. Rice	0·72	0·87	0·68	0·49	0·45	5·6	4·6	2·3	1·1	0·8
16. Paper	0·04	0·11	0·23	0·44	0·42	0·4	0·6	0·8	1·0	0·8
Average total value	12·61	18·78	30·23	43·70	55·08					

Principal Countries.	Percentages. '81–85	'96–00	'01–05	'06–10	1912
1. United States	39·0	27·1	28·6	30·5	31·4
2. China	17·4	19·7	23·1	23·3	26·5
3. France	24·4	12·3	9·9	9·2	8·1
4. Korea	—	3·4	5·2	6·0	—
5. United Kingdom	11·3	5·2	5·0	5·7	5·6
6. Hong-Kong	—	17·3	10·2	5·4	5·3
7. British East Indies }	1·1	3·4	4·2	3·2	4·3
11. Straits Settlements }				1·2	1·6
8. Italy	0·6	2·0	3·7	3·0	3·3
9. Germany	1·1	1·6	1·5	2·2	2·7
10. Russian Empire	0·4	1·5	0·7	1·4	1·1
Average total value in millions sterling	6·03	19·04	31·45	45·30	56·45

Values of the Yen in Pence.

Year	1891	1892	1893	1894	1895	1896	1897
Value	38·6	34·5	30·7	25·2	25·3	26·0	24·5

[1] Including Formosa from 1896.

[2] Declared values (c.i.f.).

UNITED STATES[1]

GENERAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.									Change % 1919 on 1911–13.	
	1870–5[3]	'75–80[3]	'80–85	'85–90	'90–95	'95–00	1900–05	'05–10	'11–13	'70–75[3]	'75–80[3]	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'11–13	Value.	Quant.
1. Sugar	*18·20*[4]	15·35	18·31	16·99	—	18·50	16·13	19·23	21·95	*15·1*[4]	15·0	13·2	11·4	—	12·0	8·0	6·9	6·1	+274	+59
2. Hides and skins	3·34	3·38	5·24	5·08	5·25	8·14	11·71	17·19	21·42	2·8	3·3	3·7	3·4	3·2	5·3	5·8	6·1	6·0	+198	+45
3. Chemicals	—	—	—	8·28	9·47	9·63	12·74	16·73	17·93	—	—	—	5·5	5·8	6·2	6·3	6·0	5·0	+ 46	—
4. Coffee	9·11	11·25	10·05	13·02	20·46	14·13	14·47	15·31	23·08	7·5	10·9	7·2	8·7	12·5	9·1	7·1	5·5	6·5	+136	+54
5. Raw silk[5]	*1·09*	*1·57*	*2·61*	4·23	4·70	6·48	9·58	14·04	16·80	0·9	1·5	1·8	2·8	2·9	4·2	4·7	5·0	4·7	+324	+86
6. Cottons	6·72	4·61	6·61	6·01	6·13	6·98	9·82	13·90	13·83	5·6	4·5	4·8	4·0	3·7	4·5	4·8	5·0	3·9	− 21	—
7. Rubber	1·03	1·25	2·65	2·87	3·73	5·16	7·39	12·98	19·73	0·8	1·2	1·9	1·9	2·3	3·3	3·6	4·6	5·5	+134	+197
8. Flax, jute, hemp, &c., manufrs.	—	3·81	4·86	5·03	5·17	5·76	7·98	11·68	14·26	—	3·7	3·5	3·4	3·2	3·7	3·9	4·2	4·0	+ 39	—
9. Wood and manufrs.	—	—	—	3·04	4·12	3·75	5·39	9·21	11·82	—	—	—	2·0	2·5	2·4	2·7	3·3	3·3	+ 97	—
10. Jewellery	—	—	—	2·40	2·34	2·44	6·12	7·78	9·67	—	—	—	1·6	1·4	1·6	3·0	2·8	2·7	+135	—
11. Flax, jute, hemp, &c., raw	1·21	1·15	2·07	3·42	3·63	3·56	6·87	7·47	8·74	1·0	1·1	1·5	2·3	2·2	2·3	3·4	2·7	2·4	+ 95	− 9
12. Fruit and nuts	2·28	2·28	3·61	4·08	4·44	3·68	5·80	7·11	9·42	1·9	2·2	2·6	2·7	2·7	2·4	2·4	2·5	2·6	+112	—
13. Silks	6·10	5·06	7·16	6·94	6·83	5·47	6·69	7·03	5·80	5·1	4·9	5·1	4·6	4·2	3·5	3·3	2·5	1·6	+ 97	—
14. Tin	—	0·60	1·03	1·48	1·60	2·21	4·49	6·30	9·77	} 2·6	{ 0·6	0·7	1·0	1·0	1·4	2·2	2·2	2·7	+ 9	−18
Tinplate	—	2·38	3·47	3·99	3·74	1·06	0·88	0·83	0·19		{ 2·3	2·5	2·7	2·3	0·7	0·4	0·3	0·1	− 93	−98
15. Iron and steel and manufactures	*9·62*[6]	3·97	7·40	5·17	2·99	2·55	5·26	5·82	6·19	8·0[6]	3·9	5·3	3·5	1·8	1·7	2·6	2·1	1·7	− 10	—
16. Woollens	9·95	5·93	7·91	10·13	7·11	6·14	3·63	4·43	3·43	8·3	5·8	5·7	6·8	4·3	4·0	1·8	1·6	1·0	+ 18	—
Average total value	120·4	102·6	139·0	149·4	163·6	154·5	202·5	280·2	357·2											

SPECIAL EXPORTS,[7] EXCLUDING BULLION AND SPECIE

Principal Articles.	1870–5	'75–80	'80–85	'85–90	'90–95	'95–00	1900–05	'05–10	'11–13	'70–75	'75–80	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'11–13	Value.	Quant.
1. Raw cotton	41·12	36·5	45·57	46·79	48·07	45·95	69·64	91·16	119·14	39·2	25·2	28·2	31·0	26·3	19·4	23·4	25·0	25·0	+ 99	− 30
2. Wheat and flour	12·82	24·8	32·83	22·15	30·67	30·87	27·30	24·54	23·89	12·2	17·1	20·2	14·7	16·8	13·0	9·2	6·7	5·0	+478	+129
Flour	*3·51*	*5·1*	*9·98*	*10·31*	*13·60*	*13·25*	*13·25*	*11·84*	*11·04*	*3·3*	*3·5*	*6·1*	*6·8*	*7·5*	*5·6*	*4·5*	*3·2*	*2·3*	+454	+132
3. Machinery, including agricultural	1·66	1·89	2·68	2·62	4·27	10·69	15·64	22·41	32·24	1·6	1·3	1·7	1·7	2·3	4·5	5·3	6·1	6·8	+171	—
4. Iron and steel	1·15	1·80	2·01	1·99	2·86	8·33	12·15	18·63	33·13	1·1	1·2	1·2	1·3	1·6	3·5	4·1	5·1	6·9	+271	—
5. Copper	—	—	—	0·52	2·03	7·11	10·60	18·01	25·31	—	—	—	0·3	1·1	3·0	3·6	4·9	5·3	− 3	−38
6. Wood and manufrs.	3·46	3·40	4·79	5·35	5·56	8·40	11·72	15·86	21·99	3·3	2·3	2·9	3·5	3·0	3·5	3·9	4·3	4·6	+ 30	—
7. Illuminating oil[8]	*6·73*	*8·84*	*9·01*	*9·02*	*8·42*	9·88	11·08	13·13	13·55	*6·4*	*6·1*	*5·5*	*6·0*	*4·6*	4·2	3·7	3·6	2·8	+ 83	−10
8. Lard	3·85	6·09	5·78	5·28	7·47	7·77	10·14	11·18	11·62	3·7	4·2	3·5	3·5	4·1	3·3	3·4	3·1	2·4	+327	+44
9. Bacon and hams	6·34	10·51	9·28	7·45	9·81	11·81	10·94	10·10	10·10	6·0	7·2	5·7	4·9	5·4	5·0	3·7	2·8	2·1	+1062	+370
10. Leather and manfrs.	0·96	1·64	1·79	2·16	2·80	4·64	6·64	9·27	12·60	0·9	1·1	1·1	1·4	1·5	2·0	2·2	2·5	2·6	+401	—
11. Maize	4·31	9·71	6·79	5·84	5·36	13·35	9·03	7·95	5·90	4·1	6·7	4·2	3·9	2·9	5·6	3·0	2·2	1·2	− 34	−76
12. Coal	—	0·48	0·85	1·19	2·09	2·77	5·05	7·51	12·24	—	0·3	0·5	0·8	1·1	1·2	1·7	2·1	2·6	+105	+15
13. Cottons	0·53	2·32	2·64	2·59	2·78	4·27	6·53	7·32	10·67	0·5	1·6	1·6	1·7	1·5	1·8	2·2	2·0	2·2	+433	—
14. Leaf tobacco	4·11	5·03	4·04	4·80	4·77	5·26	6·23	6·91	9·86	3·9	3·5	2·5	3·2	2·6	2·2	2·1	1·9	2·1	+449	+90
Average total value	105·0	145·3	161·4	151·2	182·6	236·7	297·3	364·8	477·0											

For notes, see page 753.

UNITED STATES

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	Percentages of Total Value.								
	'70–75	'75–80	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'10–14
1. United Kingdom	36·1	26·9	25·7	24·0	20·4	19·6	17·3	16·7	16·3
2. Germany	7·5	7·7	8·8	11·4	10·9	12·3	11·3	11·2	9·9
3. France	7·5	10·6	11·5	9·8	8·4	8·7	8·6	8·6	7·2
4. Cuba	12·2	12·5	8·9	7·1	8·8	3·5	6·3	7·2	7·5
5. Brazil	6·4	9·1	7·2	7·5	11·1	8·6	8·1	6·8	6·3
6. British North Amer.	5·9	5·6	6·3	5·6	4·6	5·0	5·4	5·9	7·6
7. British East Indies	2·5	2·8	2·8	2·7	2·8	3·9	5·1	5·2	5·7
8. Japan	1·2	2·5	2·0	2·5	2·9	3·6	4·3	4·9	5·4
9. Mexico	—	1·2	1·3	2·4	3·4	2·9	4·1	3·9	4·4
10. Italy	1·4	1·6	2·0	2·6	2·8	3·1	3·4	3·5	3·0
11. China and Hong-Kong	3·7	3·5	3·1	2·6	2·6	3·1	2·6	2·4	2·2
12. Belgium	0·9	1·2	2·3	1·3	1·3	1·6	2·1	2·2	2·2
13. Netherlands	—	0·8	1·1	1·6	1·7	1·9	2·1	2·0	2·1
18. Australasia	0·4	0·3	0·5	0·7	0·8	0·8	0·7	1·2	0·9
20. Brit. W. Indies & Guiana	1·2	1·4	1·8	2·3	2·3	2·2	1·5	0·9	0·8
Hawaii	0·2	0·6	1·1	1·6	1·3	2·2	—	—	—

To	Percentages of Total Value.								
	'70–75	'75–80	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'10–14
1. United Kingdom	53·6	53·1	53·0	52·1	49·3	43·1	38·3	31·5	25·9
2. Germany	8·9	7·9	7·9	9·0	10·5	12·5	13·4	14·2	12·6
3. British North Amer.	6·3	4·9	5·3	4·9	5·1	6·4	8·1	9·7	15·0
4. France	6·0	9·5	7·6	6·3	6·9	5·9	5·3	6·2	6·6
5. Netherlands	—	1·9	2·3	2·4	4·1	5·6	5·3	5·5	4·9
6. Mexico	—	0·8	1·4	1·3	1·7	2·1	2·9	3·2	2·1
7. Italy	1·2	1·3	1·2	1·7	1·7	2·1	2·4	3·1	3·5
8. Belgium	2·6	3·5	3·5	3·4	3·5	3·5	3·1	2·7	2·3
9. Cuba	2·8	1·8	1·5	1·5	2·0	1·2	1·8	2·7	3·0
10. Argentina	0·4	0·3	0·5	0·9	0·4	0·7	1·0	1·9	2·0
11. Japan	0·2	0·3	0·3	0·6	0·5	1·5	1·9	1·9	2·3
12. China and Hong-Kong	0·5	0·8	1·0	1·2	1·1	1·6	2·3	1·9	1·4
13. Australasia	0·6	0·8	1·2	1·5	1·1	1·6	2·0	1·8	2·3
17. Brazil	1·2	1·1	1·1	1·2	1·6	1·1	0·8	1·1	1·5
19. Brit. W. Indies & Guiana	1·6	1·3	1·3	1·3	1·2	1·0	0·9	0·8	0·6
22. British East Indies	0·1	0·2	0·4	0·6	0·4	0·4	0·4	0·5	0·7
Hawaii	0·1	0·2	0·4	0·5	0·4	0·6	—	—	—

During the American Civil war (1861–65), and after that period down to 1879, the currency of the United States consisted of inconvertible paper, which circulated at a varying discount. While that currency lasted, the export tables were made up partly in terms of the value of the paper dollar, partly in terms of the gold value, and from the annual reports of the trade of the United States it is impossible to tell what proportion is entered on the one basis and what on the other. It seemed accordingly not worth while to calculate the quinquennial averages for the exports of that period in the same way as has been done for other countries. Instead of that the calculation has been made for individual years in accordance with the average value of the paper dollar for that year. The figures got by this method must be somewhat inaccurate for the reason just stated, but they are at least a nearer approximation to the truth than if the conversion had been made at the usual rate. The averages for the total value of American commerce given in the table on p. 752 are based on the gold values given in the Statistical Abstract for the United States.

[1] Year ends June 30.
[2] Actual market values in country whence imported.
[3] Imports 1870–75, 1875–80, exports 1873, 1878.
[4] Including molasses.
[5] Including waste and cocoons from 1885–90; value in that period, £150,000.
[6] Excluding machinery; value 1875–80, £160,000 (0·2 per cent.).
[7] Market values at time and place of shipment.
[8] 'Refined mineral oil' 1870–95; value in 1895–1900, £11·8 million.

MEXICO[1]

GENERAL IMPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.			Percentages.		
	1900–05	1905–10	1912	1900–05	1905–10	1912
1. Machinery and engines	1·60	2·25	2·17	10·8	10·7	11·6
2. Cotton manufactures[3]	0·91	1·09	0·98	6·1	5·2	5·3
3. Chemicals and drugs	0·59	0·99	1·23	3·9	4·7	6·6
4. Iron and steel	0·59	0·89	0·84	3·9	4·3	4·5
5. Railway materials and carriages	0·75	0·88	0·48	5·0	4·2	2·6
6. Coal and coke	0·76	0·85	0·45	5·1	4·1	2·4
7. Wood for building	0·39	0·60	0·53	2·6	2·9	2·8
8. Woollen manufactures[3]	0·38	0·47	0·36	2·6	2·3	1·9
9. Paper and manufactures of	0·42	0·47	0·43	2·8	2·3	2·3
10. Silks and half-silks[3]	0·31	0·41	0·38	2·1	1·9	2·0
11. Mineral oil	0·16	0·38	0·25	1·1	1·8	1·3
Average total value	14·87	20·94	18·65			

GENERAL EXPORTS,[4] INCLUDING BULLION AND SPECIE

Principal Articles.	1900–05	1905–10	1912	1900–05	1905–10	1912
1. Silver bullion and ore	5·34	7·82		31·9	30·6	
2. Gold bullion and ore	0·97	3·35		5·8	13·1	
3. Henequen, raw	2·58	2·73		15·6	10·7	
4. Copper, unwrought, and ore	1·90	2·63		11·3	10·3	
5. Coffee	0·82	0·97		4·9	3·8	
6. Hides and skins, raw	0·60	0·93		3·6	3·6	
7. Rubber	0·04	0·89		0·3	3·5	
8. Lead	0·50	0·55		3·0	2·2	
9. Ixtle	0·25	0·33		1·5	1·3	
10. Chick peas	0·16	0·32		1·0	1·3	
11. Cattle	—	0·29		2·5	1·1	
12. Chicle gum	—	0·24		0·8	1·0	
13. Vanilla	—	0·24		0·9	1·0	
Average total value	16·67	25·58				

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'95–00	'00–05	'05–10	1912	To	'95–00	'00–05	'05–10	1912
1. United States	49·7	55·4	59·8	53·9	1. United States	76·1	74·9	72·0	75·2
2. United Kingdom	17·7	13·2	11·5	11·8	2. Utd. Kingdom	12·2	10·2	12·2	13·5
3. Germany	10·6	11·4	10·8	13·2	3. Germany	3·3	5·1	6·7	3·5
4. France	12·2	9·5	8·1	8·6	4. France	3·2	2·3	4·1	2·8
5. Spain	5·0	4·2	3·3	3·2	5. Belgium	1·2	3·3	2·6	2·1
6. Belgium	1·2	2·2	1·3	1·8	6. Cuba	—	2·7	0·9	0·7
7. Italy	0·6	0·8	0·9	1·1	7. Spain	0·8	0·8	0·9	0·8
8. Austria-Hun.	0·5	0·6	0·6	1·1					
9. India	0·5	0·6	0·6	1·1					

URUGUAY

SPECIAL IMPORTS,[5] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentages.			
	'91–95	'01–05	'06–10	—[6]	'91–95	'01–05	'06–10	—[6]
1. Cottons	0·45	0·49	0·55	0·61	10·2	9·5	7·1	6·5
2. Iron and steel manufactures	0·30	0·34	0·53	0·67	6·7	6·6	6·8	7·1
3. Sugar and molasses	0·27	0·37	0·46	0·47	6·2	7·1	5·9	5·0
4. Wood	0·11	0·22	0·46	0·76	2·4	4·3	5·9	8·2
5. Coal	0·20	0·27	0·44	0·55	4·5	5·1	5·6	5·9
6. Wine	0·52	0·32	0·34	0·34	11·7	6·1	4·4	3·6
7. Yerba maté	0·16	0·20	0·24	0·25	3·7	3·9	3·1	2·7
Average total value	4·43	5·18	7·80	9·33				

SPECIAL EXPORTS,[7] EXCLUDING BULLION AND SPECIE

Principal Articles.	'91–95	'01–05	'06–10	—[6]	'91–95	'01–05	'06–10	—[6]
1. Wool, raw	1·78	2·29	3·26	5·40	29·1	32·7	40·2	53·1
2. Hides and skins, raw	1·57	1·95	1·94	1·79	25·7	27·8	24·0	17·6
3. Meat, salted or smoked	0·96	1·02	0·80	0·64	15·7	14·6	9·9	6·3
4. Tallow	0·34	0·35	0·30	0·32	5·6	5·0	3·7	3·1
5. Meat extract	0·42	0·28	0·25	0·11	6·8	3·9	3·1	1·1
6. Cattle	0·18	0·11	0·21	0·12	2·9	1·6	2·6	1·2
7. Wheat and flour	0·26	0·16	0·19	0·26	4·3	2·3	2·3	2·5
8. Linseed	—	0·10	0·09	0·11	—	1·4	1·1	1·0
9. Horse hair	0·07	0·08	0·07	0·05	1·2	1·1	0·9	0·4
Average total value	6·11	7·00	8·11	10·16				

[1] Year ends June 30.
[2] 'Invoice values.'
[3] Including ready-made clothing.
[4] 'Declared values.'
[5] 'Official values,' completely revised in 1909, but minor alterations are made from time to time.
[6] 1911 for imports, 1912 for exports.
[7] Current market prices in Uruguay.

BRAZIL

GENERAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.			Percentages.		
	1902–05	1906–10	1912	1902–05	1906–10	1912
1. Iron and steel manufactures	1·93	4·38	7·42	7·5	11·3	11·7
2. Wheat and wheat flour	2·60	3·82	5·31	10·1	9·8	8·4
3. Machinery and tools	1·39	3·41	7·26	5·4	8·8	11·4
4. Cottons	3·02	3·33	4·10	11·7	8·6	6·5
5. Coal	1·29	1·99	3·81	5·0	5·1	6·0
6. Wine	1·53	1·74	2·58	5·9	4·5	4·1
7. Jerked beef	1·35	1·05	0·93	5·2	2·7	1·5
8. Cod, salted	0·67	0·91	1·35	2·6	2·4	2·1
9. Chemicals and drugs	0·57	0·88	1·44	2·2	2·3	2·3
10. Mineral oil	0·57	0·78	1·16	2·2	2·0	1·8
Average total value	25·81	38·85	63·42			

GENERAL EXPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	1902–05	1906–10	1912	1902–05	1906–10	1912
1. Coffee	20·20	27·88	46·56	51·3	50·1	62·4
2. Rubber	10·67	16·62	16·10	27·1	29·9	21·6
3. Hides and skins, raw	1·90	2·42	2·77	4.8	4·3	3·7
4. Herba maté	0·99	1·75	2·10	2·5	3·1	2·8
5. Cacao	1·04	1·67	1·53	2·6	3·0	2·1
6. Tobacco	0·95	1·20	1·43	2·4	2·2	1·9
7. Raw cotton	1·13	1·02	1·04	2·9	1·8	1·4
8. Sugar	0·41	0·48	0·06	1·0	0·9	0·1
9. Gold in bars	0·43	0·44	0·44	1·1	0·8	0·6
10. Manganese ore	0·28	0·33	0·23	0·7	0·6	0·3
11. Carnauba wax	0·16	0·32	0·36	0·4	0·6	0·5
12. Brazil nuts	0·17	0·24	0·44	0·4	0·4	0·6
15. Monazite sand	0·08	0·12	0·11	0·2	0·2	0·1
Average total value	39·35	55·64	74·65			

COUNTRIES OF ORIGIN AND DESTINATION

From	'02–05	'06–10	1912	To	'02–05	'06–10	1912
1 United Kingdom	27·6	28·5	25·2	1. United States	42·5	36·7	39·1
2. Germany	12·5	15·3	17·2	2. United Kingdom	17·8	17·5	11·9
3. United States	11·2	12·4	15·6	3. Germany	14·9	15·5	14·3
4. Argentina	10·1	9·5	7·5	4. France	8·0	10·0	9·8
5. France	8·9	9·3	9·0	5. Netherlands	3·2	4·4	6·3
6. Portugal	7·2	5·7	4·7	6. Argentina	2·7	3·6	3·9
7. Belgium	3·1	4·2	5·4	7. Austria-Hungary	3·0	3·2	5·0
8. Italy	3·6	3·3	3·9	8. Belgium	2·0	2·7	2·7
9. Uruguay	5·1	3·0	2·5	9. Uruguay	1·3	1·7	1·1
10. Austria-Hungary	1·8	1·5	1·4	10. Italy	0·9	0·8	1·1

URUGUAY

COUNTRIES OF ORIGIN AND DESTINATION

From	Percentages.				To	Percentages.			
	'91–95	'01–05	'06–10	1911		91–95	'01–05	'06–10	1912
1. Utd. Kingdom	31·5	25·9	29·7	27·1	France	18·8	16·4	20·1	17·4
2. Germany	11·1	13·3	16·2	16·9	Argentina	13·8	17·6	18·3	14·5
3. France	10·8	10·4	10·3	8·5	Belgium	13·0	16·8	15·8	15·6
4. United States	6·2	9·1	9·7	12·2	Germany	5·6	12·0	12·9	15·6
5. Italy	9·6	8·9	7·8	7·2	Brazil	20·2	13·4	9·1	7·5
6. Argentina	7·0	13·7	7·3	9·0	United Kingdom	14·7	7·9	7·2	12·9
7. Belgium	5·0	4·9	6·5	7·2	United States	7·1	6·5	6·4	5·3
8. Brazil	8·3	6·1	5·0	4·4	Italy	1·5	2·5	3·3	2·6
9. Spain	8·8	6·2	5·0	4·6	Cuba	1·3	2·4	2·6	1·9
Total value	4·43	5·18	7·80	9·33	Total value	6·11	7·00	8·12	10·16

[1] Declared values, f.o.b. at a Brazilian port.

ARGENTINA

SPECIAL IMPORTS,[1] INCLUDING SILVER BULLION

Principal Articles.	Average Value in Millions Sterling.					Percentages of Total Value.				
	1876–80	'91–95	1901–05	'06–10	1912	'76–80	'91–95	'01–05	'06–10	1912
1. Iron and steel, total	—	2·08	3·77	—	—	—	11·7	12·7	—	—
Machinery and tools	—	0·76	1·72	3·43	4·57	—	4·3	5·8	5·8	5·9
Unwrought, galvanised, and tinplate	—	0·47	1·20	2·26	2·82	—	2·7	4·1	3·8	3·7
Rails and fishplates	—	—	0·86	2·25	1·29	—	—	2·9	3·8	1·7
2. Cottons, pure	*1·11*	2·67	2·93	3·98	4·38	*13·2*	14·2	9·9	6·7	5·7
3. Coal and coke	0·14	1·09	1·63	3·67	5·24	1·7	6·2	5·5	6·2	6·8
4. Chemicals and dyes	—	0·70	1·19	2·27	3·36	—	4·0	4·0	3·8	4·4
5. Wine	0·96	1·17	1·05	1·96	2·04	11·3	6·6	3·5	3·3	2·7
6. Sackcloth	—	0·67	1·15	1·39	1·74	—	3·8	3·9	2·3	2·3
7. Wood and manufactures	—	0·81	2·08	1·38	1·98	—	4·6	7·0	2·3	2·6
8. Apparel	—	0·73	0·62	1·35	2·02	—	4·1	2·1	2·3	2·6
9. Railway materials exc. rails	—	1·00	0·51	1·27	1·04	—	5·6	1·7	2·1	1·4
10. Paper and manufactures	—	0·51	0·67	1·26	1·97	—	2·9	2·3	2·1	2·6
11. Woollens	—	0·92	0·70	1·02	1·23	—	4·9	2·4	1·7	1·6
12. Olive oil	0·16	0·25	0·34	0·62	0·98	1·9	1·4	1·2	1·0	1·3
Average total value	8·41	17·71	29·63	59·33	76·97					

Principal Countries.	Percentages.				
	'76–80	'91–95	'01–05	'06–10	1912
1. United Kingdom	26·2	38·3	33·9	33·4	30·8
2. Germany	5·0	11·2	13·6	15·4	16·6
3. United States	6·7	8·4	13·4	13·8	15·4
4. France	20·4	11·2	9·5	9·7	9·8
5. Italy	5·8	9·3	11·0	8·9	8·4
6. Belgium	5·5	8·8	5·1	5·0	5·3
7. Spain	5·6	2·5	2·9	2·9	3·1
8. Brazil	5·5	2·7	3·5	2·6	2·5
9. Uruguay	5·9	2·7	0·5	0·8	0·6
10. Netherlands	—	0·1	0·6	0·7	0·9

SPECIAL EXPORTS,[2] INCLUDING SILVER BULLION.

Principal Articles.	Average Value in Millions Sterling.					Percentages of Total Value.				
	1876–80	'91–95	1901–05	'06–10	1912	'76–80	'91–95	'01–05	'06–10	1912
1. Wheat	0·06	4·02	9·56	18·25	19·57	0·6	18·9	20·7	26·5	20·4
2. Raw wool	4·12	6·72	10·14	11·35	11·63	43·6	31·6	21·9	16·5	12·1
3. Maize	—	0·91	6·64	9·73	21·78	—	4·3	14·4	14·1	22·7
4. Linseed	—	0·72	4·41	7·97	6·84	—	3·4	9·5	11·6	7·1
5. Raw hides	1·66	3·32	4·77	6·06	10·03	17·6	15·6	10·3	8·8	10·4
6. Beef, chilled and salted	0·53	0·82	2·28	3·95	7·14	5·6	3·9	4·9	5·7	7·4
7. Oats	—	—	0·08	1·32	4·37	—	—	0·2	1·9	4·6
8. Tallow and grease	0·69	0·55	0·97	1·26	2·26	7·3	2·6	2·1	1·8	2·4
9. Mutton, frozen	—	0·38	1·24	1·14	1·12	—	1·8	2·7	1·7	1·2
10. Wheat flour	—	0·23	0·70	0·99	1·39	—	1·1	1·5	1·4	1·4
11. Bran	—	—	0·42	0·86	1·19	—	—	0·9	1·2	1·2
12. Cattle	—	0·90	0·69	0·55	1·83	—	4·2	1·5	0·8	1·9
Average total value	9·44	21·30	46·21	68·98	96·08					

Principal Countries.	Percentages.				
	'76–80	'91–95	'01–05	'06–10	1912
1. United Kingdom	10·8	16·9	15·8	19·5	25·3
2. Germany	3·3	11·9	11·9	11·4	11·2
3. France	23·5	20·3	13·9	10·4	7·5
4. Belgium	27·7	13·5	7·4	9·4	7·8
5. United States	7·0	5·0	4·6	5·1	6·7
6. Brazil	4·3	5·7	4·3	4·4	4·7
7. Italy	3·3	3·3	2·1	2·5	4·4
8. Netherlands	0·1	0·1	1·4	1·3	3·3
9. Spain	1·9	1·9	0·9	0·8	0·7
10. Chile	4·7	2·0	0·5	0·6	0·5
11. Uruguay	3·0	3·7	2·0	0·6	1·0

[1] 'Official values,' revised 1902, 1905, and 1906, minor alterations since.

[2] Current market prices in Argentina.

CHILE

SPECIAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentages.			
	1898–00	1901–05	1906–10	1912	1898–00	1901–05	1906–10	1912
1. Machinery	0·22	0·99	2·43	2·61	2·6	8·7	11·9	10·4
2. Coal	0·98	1·28	2·06	2·29	11·6	11·2	10·1	9·1
3. Cottons	0·89	1·37	1·35	1·34	10·6	12·0	6·6	5·3
4. Iron and steel	0·24	0·64	1·24	1·49	2·9	5·6	6·1	5·9
5. Oxen	0·19	0·29	0·79	0·71	2·2	2·6	3·9	2·8
6. Woollens	0·34	0·56	0·75	0·85	4·1	4·8	3·7	3·4
7. Sacks	0·23	0·29	0·53	0·68	2·7	2·5	2·6	2·7
Average total value	8·43	11·40	20·37	25·08				

SPECIAL EXPORTS,[2] INCLUDING 'NATIONALISED PRODUCTS,' AND BULLION AND SPECIE

Principal Articles.	1898–00	1901–05	1906–10	1912	1898–00	1901–05	1906–10	1912
1. Soda nitrate	7·43	10·99	16·56	21·92	59·6	69·9	73·5	77·5
2. Copper	1·16	1·34	1·15	1·12	9·3	8·5	5·1	4·0
3. Grain and flour	0·52	0·45	0·75	0·68	4·2	2·9	3·3	2·4
4. Coal (bunker)	0·35	0·49	0·65	0·90	2·8	3·1	2·9	3·2
5. Copper ore	0·19	0·16	0·43	0·63	1·5	1·0	1·9	2·2
6. Iodine	0·29	0·36	0·37	0·40	2·3	2·3	1·7	1·4
7. Borate of lime	0·12	0·11	0·32	0·46	0·9	0·7	1·4	1·6
Average total value	12·47	15·71	22·53	28·28				

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'76–80	'01–05	'06–10	1912	To	'76–80	'01–04[3]	'06–10	1912
1. Utd. Kingdom	36·7	37·5	34·4	31·6	Utd. Kingdom	65·3	30·5	45·6	40·0
2. Germany	12·4	26·3	25·2	27·2	Germany	3·9	28·4	20·4	20·4
3. Utd. States	6·4	10·0	10·6	13·8	Utd. States	2·9	13·7	15·9	17·8
4. France	18·9	6·8	5·8	5·9	France	7·4	13·3	5·5	5·6
5. Argentina	8·3	3·0	4·5	3·4	Belgium	0·1	4·4	2·3	3·4
6. Peru	7·0	3·6	4·0	3·9	Argentina	1·2	0·2	0·9	0·8
7. Australia	—	3·4	3·7	2·5	Peru	7·8	1·4	0·9	0·7
8. Belgium	2·2	1·8	3·2	2·6					
9. Italy	1·1	2·6	2·7	2·5					
10. India	—	1·1	2·5	2·7	Total	—	14·40	22·53	28·28

[1] 'Official values' revised in 1903 and 1908, with minor alterations since.
[3] Countries of ultimate destination 1901–4, excluding 'nationalised products' 1901–6 inclusive.

PERU

SPECIAL IMPORTS,[4] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.		Percentages.	
	1902–05	1906–09	1902–05	1906–09
1. Cottons	0·51	0·54	12·7	10·7
2. Iron and steel manufactures	0·39	0·49	9·8	9·7
3. Grain and flour	0·28	0·41	6·9	8·1
4. Coal	0·15	0·25	3·9	4·9
5. Machinery	0·17	0·25	4·4	4·9
6. Woollens	0·19	0·23	4·9	4·6
7. Timber	0·15	0·18	3·7	3·5
Average total value	3·98	5·03		

SPECIAL EXPORTS,[4] INCLUDING BULLION AND SPECIE

Principal Articles.	1902–05	1906–09	1902–05	1906–09
1. Copper, silver ores, &c.	0·97	1·61	22·3	27·6
2. Sugar	1·28	1·11	29·4	19·0
3. Resins and gums	0·60	0·91	13·8	15·6
4. Raw cotton	0·32	0·73	7·3	12·5
5. Wool, alpaca, llama	0·30	0·30	6·9	5·1
6. Guano	0·11	0·29	2·5	5·0
7. Wool, sheep's	0·06	0·10	1·4	1·8
8. Hides and skins	0·11	0·10	2·4	1·7
9. Straw hats	0·04	0·10	1·0	1·6
Average total value	4·35	5·85		

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'02–05	'06–10	1911	To	'02–05	'06–10	1911
1. Utd. Kingdom	35·5	31·7	31·6	Utd. Kingdom	46·6	40·5	33·3
2. Utd. States	16·7	21·5	23·0	Utd. States	12·1	22·4	28·3
3. Germany	15·4	16·0	17·4	Chile	13·6	13·0	17·6
4. France	5·9	6·0	5·3	France	5·6	8·4	5·3
5. Belgium	4·7	4·9	6·1	Germany	7·9	6·5	7·7
6. Chile	5·5	4·5	1·4	Bolivia	4·4	3·0	2·0
7. Australia	2·4	4·3	4·2	Spain	0·5	0·7	0·8
8. Italy	3·9	3·5	3·7				
Average total	3·98	5·02	5·44		4·35	6·10	7·42

[2] Current market prices in Chile.
[4] 'Official values' adopted in 1901, with minor alterations since.

VENEZUELA [1]

GENERAL TRADE, EXCLUDING BULLION AND SPECIE

From	Percentages. '03–05	'05–10	'11–12	To	Percentages. '03–05	'05–10	'11–12
1. United Kingdom	28·9	31·9	25·1	1. United States	29·7	36·8	32·5
2. United States	26·9	29·1	30·6	2. France	27·7	29·7	29·2
3. Germany	21·6	20·0	15·4	3. U.K. Trinidad, &c.	9·2	9·3	8·0
4. Netherlands	5·3	7·1	7·0	4. Netherlands	14·5	7·3	1·4
5. Spain	4·7	5·0	4·2	5. Germany	4·9	6·5	16·9
6. France	9·4	3·6	13·1	6. Cuba	10·0	4·5	0·1
7. Italy	2·8	2·8	3·2	7. Spain	3·1	3·8	6·0
8. Belgium	0·2	0·3	0·6	8. Austria-Hungary	0·3	0·5	1·5
Aver. total value	2·16	2·05	4·23	Aver. total value	3·06	3·28	5·33

CUBA [1]

GENERAL TRADE, INCLUDING SPECIE

From	'02–05	'05–10	'11–12	To	'02–05	'05–10	'11–12
1. United States	40·4	48·0	52·3	1. United States	82·8	85·5	83·8
2. United Kingdom	14·9	13·8	13·2	2. United Kingdom	6·8	5·3	7·5
3. Spain	13·6	9·1	8·3	3. Germany	4·6	3·4	2·5
4. France	9·7	7·8	5·7	4. France	1·3	1·6	1·7
5. Germany	5·9	6·9	6·3	5. Spain	1·5	0·9	0·3
6. Uruguay	2·4	1·9	2·0	6. Canada	0·5	0·7	1·0
7. Porto Rico	1·0	1·7	2·9	7. Argentina	0·3	0·5	0·8
8. Canada	0·7	1·5	1·4	8. Chile	0·2	0·3	0·3
9. Mexico	3·1	1·4	0·8	9. Austria-Hungary	0·2	0·3	0·1
10. British India	0·4	1·2	1·7	10. Australia	0·2	0·2	0·3
Aver. total value	15·98	20·54	25·05	Aver. total value	19·02	24·83	30·58

PHILIPPINE ISLANDS [1]

GENERAL TRADE, [2] EXCLUDING BULLION AND SPECIE

From	'00–05	'05–10	'11–12	To	'00–05	'05–10	'11–12
1. United States	13·3	20·0	37·8	1. United States	35·6	37·2	42·8
2. United Kingdom	16·7	19·2	10·1	2. United Kingdom	32·3	21·7	14·9
3. French E. Indies	19·5	15·2	17·6	3. France	7·1	11·8	20·0
4. China	9·7	8·6	3·6	4. Hong-Kong	8·7	7·3	2·0
5. Australasia	2·5	6·6	5·7	5. Spain	4·0	5·5	4·9
6. Germany	6·0	5·8	4·4	6. China	1·7	4·8	0·8
7. Spain	7·0	5·3	2·3	7. British E. Indies	2·5	2·4	2·3
8. Japan	2·7	4·3	5·9	8. Germany	0·5	1·9	3·5
9. British E. Indies	7·5	4·1	3·6	9. Australasia	1·6	1·4	1·0
10. France	4·0	3·0	2·3	10. Japan	3·9	1·3	2·4
Aver. total value	6·65	6·27	11·36	Aver. total value	5·95	7·05	10·48

NETHERLANDS EAST INDIES

GENERAL TRADE, [3] EXCLUDING BULLION AND SPECIE

From	'02–05	'06–10	1912	To	'02–05	'06–10	1912
1. Netherlands	30·9	32·9	34·3	1. Netherlands	29·5	25·0	29·5
2. Straits Settlemts.	38·8	26·8	19·6	2. Straits Settlemts.	27·5	24·4	23·8
3. United Kingdom	13·9	14·6	16·8	3. British India	3·3	11·8	10·7
4. British India	2·2	5·7	9·8	4. Hong-Kong	7·8	6·7	4·1
5. Saigon	2·1	3·9	—	5. United States	8·2	6·5	3·9
6. Germany	2·2	3·8	5·5	6. Japan	4·0	5·0	4·0
7. Hong-Kong	2·0	2·2	2·1	7. France	4·5	4·6	5·1
8. Australia	1·3	1·8	2·3	8. Port Said & Suez	4·9	4·5	3·5
9. United States	1·5	1·7	1·9	9. United Kingdom	3·9	2·5	5·1
10. China	0·9	1·5	1·6	10. China	1·0	2·0	2·1
11. Japan	1·1	1·1	1·3	11. Australia	1·7	2·0	2·6
12. Siam	0·5	1·1	0·6	12. Germany	0·9	1·9	2·8
Aver. total value	15·14	20·87	31·60	Aver. total value	21·62	32·12	44·69

[1] Year ends June 30.

[2] Non-dutiable merchandise from the United States imported by the government and by the United States army and navy, as well as railway free entries, are excluded.

[3] Total of Private merchandise only. Government average total imports, including Bullion, £0·82 million in 1902–05; £0·64 in 1906–10; £1·69 in 1912; export £1·67 in 1902–05; £1·61 in 1906–10; £4·28 in 1912. The figures in this table do not appear to be open to the objection indicated in the tables showing the supposed value of the trade of the Netherlands. In the original returns giving the quantity and value of the exports of Peruvian bark from Java and Madura in 1912, the bark is valued at 0·4 gulden per kilog.; in those showing the same for the imports into the Netherlands the bark is valued in the same year at 40 gulden per kilog.

SHIPPING TABLES

I.—TONNAGE OF MERCHANT NAVIES IN MILLIONS[1]

—	1850	1860	1870	1880	1890	1900	1910
United Kingdom	3·57	4·66	5·69	6·57	7·98	9·30	11·56
United States[2]	1·59	2·55	1·52	1·35	0·95	0·83	0·79
German Empire[3]	—	—	0·98	1·18	1·43	1·94	2·90
Norway[4]	0·30	0·56	1·02	1·52	1·71	1·51	1·53
Japan[5]	—	—	—	—	—	0·86	1·65

II.—AGGREGATE GROSS TONNAGE[6] OF VESSELS ABOVE 100 TONS BURDEN BELONGING TO ALL COUNTRIES WITH A TOTAL OF MORE THAN 200,000 TONS

Counties.	1914		1921	
	Million Tons.	Percentage of Total.	Million Tons.	Percentage of Total.
British: United Kingdom	18·88	44·4	19·29	35·6
British: British Dominions	1·40	3·3	1·95	3·6
British: Total	20·28	47·7	21·24	39·2
United States	1·84	4·3	12·31	22·9
France	1·92	4·5	3·05	6·5
Japan	1·64	3·9	3·00	5·5
Italy	1·43	3·4	2·38	4·4
Norway	1·92	4·5	2·29	4·2
Holland	1·47	3·4	2·21	4·1
Spain	0·88	2·1	1·09	2·0
Sweden	0·99	2·3	1·04	1·9
Denmark	0·77	1·8	0·87	1·6
Germany	5·10	12·0	0·65	1·2
Greece	0·82	1·9	0·58	1·1
Austria-Hungary	1·05	2·5	—	—
Total	42·51	100·0	54·22	100·0

[1] The figures down to 1910 are taken from a British Blue-book [Cd. 7033] of 1913, where they are given as extracted from 'Lloyds' Register,' and probably, therefore, give the sum of the net tonnage of sailing vessels and the gross tonnage of steamers, usually exclusive of vessels under 100 tons.

[2] Vessels registered for oversea trade.

[3] Vessels of 17½ tons and upwards.

[4] Vessels of 4 tons and upwards.

[5] Vessels of foreign type, but including sailing vessels of half Japanese, half foreign type; in all cases gross tons.

[6] Not comparable therefore with the figures in Table I, which reckons, except for Japan, only the net tonnage of sailing vessels.

YEARLY RETURN OF SHIPPING AND NET TONNAGE THROUGH THE SUEZ CANAL FROM ITS OPENING

Tonnage in thousands of tons (000 omitted).

Year.	No. of Vessels.	Tonnage.	Year.	No. of Vessels.	Tonnage.	Year.	No. of Vessels.	Tonnage.
1869	10	6·6	1876	1,457	2,097	1913	5,085	20,034
1870	486	437	1877	1,663	2,355	1915	3,708	15,266
1871	765	761	1878	1,593	2,270	1916	3,110	12,325
1872	1,082	1,161	1879	1,477	2,263	1917	2,353	8,369
1873	1,173	1,368	1880	2,026	3,057	1918	2,522	9,252
1874	1,264	1,632	1881	2,727	4,137	1919	3,986	16,014
1875	1,494	2,010	1882	3,198	5,057	1920	4,009	17,575

Australian Traffic through the Canal from 1878

Year.	No. of Vessels.	Net Tonnage.	Year.	No. of Vessels.	Net Tonnage.	Year.	No. of Vessels.	Net Tonnage.
1878	27	46	1882	166	343	1904	236	924
1879	42	72	1883	226	489	1907	314	1,318
1880	51	108	1884	253	554	1908	—	1,234
1881	98	209	1885	228	534	1909	—	1,544

The average duration of the passage in 1887 (the first year in which night passages were allowed) was 34 hours 3 minutes; in 1890, 24 hours 6 minutes; in 1919, 16 hours 13 minutes. The percentage of the net tonnage passing through the canal made up by British shipping was in 1900 57·6, in 1901 57·8, in 1907 64·5, in 1920 64·0.

The dimensions of the canal in feet were:—

	Depth.	Bottom width.	Breadth between Banks.
In 1870	23–26	72	175–330
In 1920	36–39	148–195	400–460

YEARLY RETURN OF SHIPPING AND NET TONNAGE THROUGH THE PANAMA CANAL

Tonnage in thousands of tons (000 omitted).

Year.	Vessels.	Atlantic to Pacific. Net Tonnage.	Pacific to Atlantic. Net Tonnage.	Total.	
				Canal Tonnage Net	Cargo Tons.
1915	1,072	1,852	1,920	3.772	4,926
1916	760	1,272	1,114	2,385	3,063
1917	1,806	2,825	2,992	5,818	7,083
1918	2,086	2,744	3,839	6,583	7,536
1919	2,028	2,675	3,447	6,122	6,923
1920	2,478	4,169	4,377	8,546	9,374

Ocean Distances in Nautical Miles

(Mainly from Philip's 'Mercantile Marine Atlas,' except for routes through the Panama Canal.)

	Hamburg.	Copenhagen. By Kiel Canal.	Gibraltar.	Marseilles.	Port Said.
London	427	587	1,313	2,003	3,213
New York	3,577	3,554	3,206	3,896	5,106

	Bombay.	Colombo.	Calcutta.	Rangoon.	Hong Kong.
London	6,260	6,702	7,902	7,905	9,688
New York	8,153	8,595	9,795	9,798	11,580

	Shanghai.		Yokohama.			
	By Suez.	By Panama.	By Suez.	By Panama.	Cape Town.	New York.
London	10,437	15,430	11,150	12,860	6,117	3,270
New York	12,324	11,240	13,042	10,220	6,995	—

	Montreal.	Newport News.	Savannah.	New Orleans.	Galveston.
London	3,241	3,438	3,840	4,761	4,955
New York	1,451	286	695	1,699	1,893

	Rio de Janeiro.	Buenos Aires.	San Francisco. By Magellan.	San Francisco. By Panama.
London	5,204	6,294	13,563	8,010
New York	4,748	5,838	13,107	5,370

	Vancouver.		Callao.		Valparaiso.	
	By Magellan.	By Panama.	By Cape Horn.	By Panama.	By Cape Horn.	By Panama.
London	14,363	8,810	10,013	6,190	8,777	7,360
New York	13,907	6,170	9,688	3,550	8,452	4,720

	Auckland. By C. Horn.	Auckland. By Panama
London	12,227	11,475 [1]
New York	11,771	8,940 [2]

	Sydney.			Fremantle.	
	By Cape Town.	By Panama.	By Suez.	By Cape Town.	By Suez.
London	12,530	12,320	11,542	10,900	9,340
New York	13,120 [3]	9,930 [4]	13,390	11,571 [3]	11,317

	Gibraltar.	Buenos Aires.
Cardiff	1,140	6,129
Newcastle	1,517	6,498
Newport News	3,360	5,774

From the east side of the Atlantic, including the Mediterranean, the distance to Liverpool is 37 miles less than to London, from New York and other parts to the south on the east coast of America 235 miles less, from Montreal 480 miles less. From London to Southampton the distance is 262 miles.

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[1] From *The Times Survey Atlas*, *via* St. Thomas to Colon, with 235 miles added for the difference of the distance from London above that of Liverpool.

[2] *Via* Rapa (in the Tubuai group in 27° 40′ S., 144° 20′ W.).

[3] *Via* St. Vincent.

[4] *Via* Rapa and Wellington.

COST OF TRANSPORT

100 tons per mile by rail, United States.[1]

Year	*s.*	Year.	*s.*	Year.	*s.*
1865	16·9	1872	10·0	1879	7·08
1866	15·4	1873	10·3	1880	7·24
1867	16·2	1874	8·18	1881	7·00
1868	14·4	1875	8·64	1882	6·10
1869	12·8	1876	8·40	1883	5·72
1870	11·6	1877	8·56	1884	5·32
1871	10·5	1878	7·41	1889	4·07

TABLE SHOWING THE AVERAGE PRODUCTION OF GOLD AND SILVER IN FIVE-YEAR PERIODS, 1851–55 TO 1866–70, AND THE YEARLY PRODUCTION FROM 1871 TO 1908.[2]

Years.	Thousand Ozs.		Years.	Thousand Ozs.	
	Gold, Fine.	Silver.		Gold, Fine.	Silver.
1851–55	6,411	28,485	1888	5,331	108,828
1856–60	6,488	29,096	1889	5,974	120,214
1861–65	5,950	35,397	1890	5,749	126,095
1866–70	6,270	43,049	1891	6,320	137,171
1871	5,591	63,317	1892	7,094	153,152
1872	5,591	63,317	1893	7,619	165,473
1873	4,654	63,267	1894	8,764	164,610
1874	4,390	55,301	1895	9,615	167,801
1875	4,717	62,262	1896	9,784	157,061
1876	5,016	67,753	1897	11,420	160,421
1877	5,512	62,680	1898	13,878	169,055
1878	5,761	73,385	1899	14,838	168,337
1879	5,262	74,383	1900	12,315	173,591
1880	5,149	74,795	1901	12,626	173,011
1881	4,984	79,021	1902	14,355	162,763
1882	4,934	86,472	1903	15,853	167,689
1883	4,615	89,175	1904	16,804	164,195
1884	4,921	81,568	1905	18,396	172,318
1885	5.246	91,610	1906	19,471	165,054
1886	5,136	93,297	1907	19,956	184,194
1887	5,117	96,124	1908	21,378	203,186

ANNUAL AVERAGE PRICE OF BAR SILVER IN LONDON, IN PENCE[3]

Extreme years, 1861 to 1872, $60\frac{5}{16}$*d.* to $61\frac{7}{16}$*d.*

Year.	*d.*	Year.	*d.*	Year.	*d.*
1873	$59\frac{1}{4}$	1880	$52\frac{1}{4}$	1907	$30\frac{3}{16}$
1874	$58\frac{5}{16}$	1881	$51\frac{11}{16}$	1908	$24\frac{3}{8}$
1875	$56\frac{7}{8}$	1882	$51\frac{5}{8}$	1909	$23\frac{11}{16}$
1876	$52\frac{3}{4}$	1883	$50\frac{9}{16}$	1910	$24\frac{5}{8}$
1877	$54\frac{13}{16}$	1884	$50\frac{5}{8}$	1911	$24\frac{9}{16}$
1878	$52\frac{9}{16}$	1885	$48\frac{5}{8}$	1912	$28\frac{1}{32}$
1879	$51\frac{1}{4}$	1886	$45\frac{3}{8}$	1913	$27\frac{9}{16}$

[1] Mainly based on *L'Economiste français*, 1886, I., p. 730.

[2] Based on the *Stat. Jahrb. f. das Deutsche Reich*, 1906, p. 23* [Cd. 4954], 1909, pp. 140–1, and the Annual Report of the Director of the Mint, U.S.

[3] Statement of Mr. Stewart Pixley, in Appendix to the First Report of the Royal Commission on Gold and Silver; the figures for 1907 to 1913 from Messrs. Pixley and Abell's *Bullion Circular*.

STANDARD COINS AND MONEYS OF ACCOUNT OF PRINCIPAL COUNTRIES[1]

A. Gold Standard Countries and countries that receive only gold in unlimited quantity for coinage, although silver may be unlimited legal tender.

Countries.	Names of Gold Coins.	Gross weight in Grains Troy.	Fine Grains per 1,000.	Fine weight in Grains on issue.	Money of Account.	Value in Pence Sterling.
United Kingdom, Australasia, and Cape Colony	sovereign .	123·274	916·667	113·0016	pound of 240 pence	240
Canada					dollar	49·35
France, Belgium, and Switzerland	20 francs .	99·563	900·000	89·607	franc[2] of 100 cents	9·51
Germany . . .	20 marks .	122·918	900·000	110·6268	mark of 100 pfennigs	11·74
Denmark, Sweden, and Norway	20 crowns	138·283	900·000	124·4542	crown of 100 ore	13·21
Netherlands . .	10 florins .	103·844	983·000	93·4599	florin (gulden) of 100 cents	19·35
Portugal . . .	10 milreis .	273·693	916·667	250·8853	milreis of 1000 reis	53·28
Brazil[3]	10 milreis .	138·348	916·667	126·8200	milreis of 1000 reis	26·93
Egypt	50 piastres	66·097	875·000	57·8347	piastre of 40 paras	2·16
United States . .	10 dollars .	258·000	900·000	232·2000	dollar of 100 cents	49·31

B. Silver Standard Countries.

Countries.	Names of Coins and Money of Account.	Gross weight in Grains Troy.	Fine Grains per 1,000.	Fine weight on issue.	Intrinsic Value in Pence Sterling; Silver at 45*d.* per Oz.	Rate of Exchange at London, June 1886.
India, Burma, Ceylon, and Mauritius	rupee of 192 pies	180·000	916·667	165·000	16·72	17⅜*d.* per R. (see pp. 585, 610)
Austria-Hungary[4].	2 florins, each =100 kreuzer	381·046	900·000	342·941	17·37[5]	£1=12·63½ fl.
Russia	rouble of 100 copecks	319·936	868·056	277·722	28·15	23⅕*d.* per R.
Mexico	peso (or dollar) of 100 centavos	417·666	902·778	377·059	38·21	38⅜*d.*[6] per P.
Shanghai . . .	tael of 1,000 cash	565·000	900·000	508·500	51·53	(see p. 750)
Japan[4] . . .	yen of 100 sen	416·000	900·000	374·400	37·93	40*d.* per yen
Dutch East Indies	florin of 25 cents	49·075	720·000	35·339	3·58	
—	trade dollar of 100 cents[7]	420·000	900·000	378·000	38·31	

[1] As in 1889, based chiefly on J. H. Norman's 'Local Dual Standards.'

[2] The French franc = the lira of Italy, the peseta of Spain, the drachma of Greece, the dinar of Servia, the ley of Roumania, the lew of Bulgaria. The peso of the Argentine Republic, Uruguay, Chile, Ecuador, Guatemala, and Costa Rica, the boliviano of Bolivia, the sol of Peru, and the venezuela of Venezuela and Colombia each = 5 francs.

[3] The actual currency in Brazil is inconvertible paper.

[4] Austria-Hungary and Japan now have a gold standard. The currency unit is a krone of 100 heller, exchanging at 24 to the £. As to Japan, see p. 553.

[5] Value of florin.

[6] Mexico being a great producer of silver (see p. 257), the rate of exchange, London on Mexico, corresponds closely to the intrinsic value of the Mexican dollar in accordance with the price of bar silver in London (see p. 762). The Mexican dollar formerly circulated in the Straits Settlements and Hong Kong, but a dollar of the value of 2*s.* 4*d.* is now the standard coin in the Straits Settlements, the Federated Malay States, British North Borneo and Saráwak.

[7] In circulation in south-eastern Asia.

I.—Table of Net or Special Imports

Averages of Five-year Periods, 1875–9 *to* 1905–8 (*four years*).

(From Statistical Tables and Charts relating to British and Foreign Trade and Industry. [Cd. 4954] 1909.)

Annual Average.	United Kingdom.				France.				Germany.				United States.			
	Total Value.[1]	Per Head of Pop.			Total Value.	Per Head of Pop.			Total Value.	Per Head of Pop.			Total Value.[2]	Per Head of Pop.		
	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.	Mln. £	£	s.	d.
1875–9	319·5	9	10	4	159·7	4	6	4	—[3]		—[3]		96·2	2	1	6
1880–4	343·6	9	15	3	190·9	5	1	2	151·8	3	7	2	140·1	2	13	4
1885–9	318·8	8	14	2	166·0	4	6	10	159·9	3	7	7	139·3	2	7	6
1890–4	357·1	9	7	1	168·8	4	8	0	198·9	3	18	10	162·7	2	10	0
1895–9	392·7	9	16	5	163·7	4	4	8	232·8	4	6	6	145·5	2	0	8
1900–4	466·1	11	2	2	182·1	4	13	3	287·0	4	19	0	186·0	2	7	1
1905–8	519·3	11	16	8	222·7	5	13	6	387·9	6	5	5	253·5	2	19	7

II.—Table of Net or Special Imports of Manufactured Goods

1875–9	59·3	1	15	4	22·5[4]	0	12	2[4]	—[3]		—[3]		40·2[5]	0	17	4
1880–4	64·7	1	16	9	28·2	0	14	11	42·8	0	18	11	65·8	1	5	1
1885–9	66·8	1	16	6	23·8	0	12	5	43·2	0	18	3	63·8	1	1	9
1890–4	75·7	1	19	8	24·6	0	12	10	44·0	0	17	5	66·4	1	0	5
1895–9	94·3	2	7	2	25·2	0	13	0	49·1	0	18	3	58·3	0	16	3
1900–4	113·4	2	14	1	32·4	0	16	7	57·0	0	19	8	78·6	0	19	11
1905–8	124·8	2	16	11	41·6	1	1	2	77·8	1	5	2	109·0	1	5	8

III.—Table of Net or Special Exports

1875–9	201·5	6	0	0	138·4	3	14	10	132·3[6]	3	1	5[6]	124·7	2	13	9
1880–4	234·3	6	13	2	138·3	3	13	4	152·8	3	7	8	165·4	3	3	0
1885–9	226·2	6	3	8	132·3	3	9	2	151·0	3	3	10	146·2	2	9	10
1890–4	234·4	6	2	10	136·8	3	11	4	152·5	3	0	5	184·7	2	16	9
1895–9	237·8	5	18	11	144·3	3	14	8	181·3	3	7	5	212·6	2	19	5
1900–4	282·7	6	14	9	168·6	4	6	4	235·6	4	1	3	292·3	3	14	0
1905–8	368·5	8	7	11	207·8	5	5	11	311·5	5	0	8	359·3	4	4	5

IV.—Table of Net or Special Exports of Manufactured Goods

1875–9	178·1	5	6	0	69·2[4]	1	17	5[4]	—[3]		—[3]		26·0	0	11	3
1880–4	206·4	5	17	3	73·1	1	18	9	91·2	2	0	4	30·6	0	11	8
1885–9	196·9	5	7	7	70·0	1	16	7	98·0	2	1	5	31·9	0	10	10
1890–4	199·1	5	4	5	73·6	1	18	4	98·6	1	19	1	38·8	0	11	11
1895–9	199·6	4	19	10	79·5	2	1	2	116·9	2	3	5	61·6	0	17	2
1900–4	224·7	5	7	1	94·6	2	8	5	154·2	2	13	2	99·8	1	5	3
1905–8	294·7	6	14	4	121·3	3	1	10	213·5	3	9	0	145·2	1	14	2

[1] Value of imports less value of re-exports.
[2] Net imports in 1890 and subsequent years.
[3] Cannot be given.
[4] Average of the four years 1876–9.
[5] Total imports of manufactured goods prior to 1890; net imports of manufactured goods in 1890 and subsequent years. The difference between the total imports and the net imports of manufactured goods in the year 1890 amounted to approximately 0·7 million £.
[6] These particulars are not strictly comparable with those for subsequent years. The difference in basis is believed to be small.

AVERAGE PRICE OF WHEAT PER IMPERIAL QUARTER AND RATE OF IMPORT DUTY FROM 1870, THE FIRST YEAR IN WHICH WHEAT WAS ADMITTED INTO THE UNITED KINGDOM FREE OF DUTY. (From [Cd. 4954] 1909.)

Years.	United Kingdom.			France (Official Average).		Germany.		United States (Average Price of Winter Wheat at New York Market).	
	'Gazette' Average of British Wheat.	Imported Wheat.	Import Duty.	Average Price.	Import Duty.	Average Price.[4]	Import Duty.	Average Price.	Import Duty.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1870	46 11	45 1		...	1 0½	43 8		37 1	6 10½
1871	56 8	50 9		59 8	,,	50 2		49 6	,,
1872	57 0	53 3		53 11	,,	51 9		51 1	,,
1873	58 8	55 9		59 7	,,	56 6		53 8	,,
1874	55 9	52 1		58 5	1 1	51 5	Free	45 2	,,
1875	45 2	45 5		45 0	,,	41 11		40 6	,,
1876	46 2	44 8		47 11	,,	45 0		41 1	,,
1877	56 9	53 6		54 7	,,	49 3		52 11	,,
1878	46 5	47 1		49 5	,,	43 3		42 4	,,
1879	43 10	45 3		51 6	,,	41 11	2 2	40 3	,,
1880	44 4	47 6		51 8	,,	46 10	,,	43 8	,,
1881	45 4	47 4		51 8	1 0½	47 1	,,	45 4	,,
1882	45 1	45 9		44 11	,,	44 7	,,	43 11	,,
1883	41 7	42 0		44 3	,,	39 7	,,	40 5	,,
1884	35 8	36 1		41 4	,,	37 0	,,	33 6	,,
1885	32 10	33 7		38 3	5 2	34 8	6 6½	33 2	,,
1886	31 0	32 4	Free	38 6	,,	33 7	,,	30 5	,,
1887	32 6	32 9		41 2	8 8	35 2	,,	30 7	,,
1888	31 10	32 11		43 9	,,	37 3	10 10½	33 5	,,
1889	29 9	32 11		42 1	,,	39 2	,,	30 4	,,
1890	31 11	33 5		44 1	,,	41 2	,,	33 9	,,
1891	37 0	38 1		47 10	5 2	47 6	,,	37 7	8 7
1892	30 3	32 10		41 6	8 8	40 6	7 7½	31 3	,,
1893	26 4	27 7		37 9	,,	32 6	,,	25 5	,,
1894	22 10	22 11		34 6	12 2	28 11	,,	21 0	
1895	23 1	23 7		32 9	,,	30 0	,,	23 0	20 % *ad val.*
1896	26 2	26 6		33 4	,,	32 9	,,	26 10	
1897	30 2	31 11		43 9	,,	35 5	,,	32 10	8 7
1898	34 0	34 4		45 8	,,[3]	39 10	,,	32 9	,,
1899	25 8	28 8		34 11	,,	33 2	,,	27 4	,,
1900	26 11	29 2		33 8	,,	32 1	,,	27 8	,,
1901	26 9	28 5		35 3	,,	34 8	,,	27 7	,,
1902[1]	28 1	28 8	...	37 9	,,	35 2	,,	28 9	,,
1903[1]	26 9	29 1	...	39 8	,,	33 2	,,	29 4	,,
1904	28 4	30 0		37 11	,,	36 2	,,	38 1	,,
1905	29 8	31 0		40 10	,,	36 7	,,	35 4	,,
1906	28 3	30 2	Free	41 0	,,	37 3	11 10[5]	29 9	,,
1907	30 7	32 11		40 7[2]	,,	43 1	,,	33 1	,,
1908	32 0	36 0		38 5[2]	,,	43 8	,,	36 1	,,

[1] A duty of 1*s.* 0¾*d.* was levied from April 15, 1902, to June 30, 1903.
[2] Average of monthly quotations published in the Journal of the Board of Agriculture and Fisheries.
[3] Wheat was admitted free of duty from May 4 to June 30, 1898.
[4] Official average, Prussia.
[5] From March 1, 1906.

MEAT SUPPLY OF THE UNITED KINGDOM (IN MILLIONS OF CWTS. AND PERCENTAGE OF TOTAL SUPPLY. (From [Cd. 4954] 1909.)

Period.	Home Produce.		Imported.		Total.	Per Head of Population.		
						Home Supply	Imported	Total
	Mil. Cwts.	%	Mil. Cwts.	%	Mil. Cwts.	Lbs.	Lbs.	Lbs.
1890–1–1893–4	25·5	66·6	12·8	33·4	38·2	74·7	37·5	112·2
1894–5–1898–9	24·0	58·0	17·4	42·0	41·5	67·3	48·8	116·1
1899–1900–1903–4	25·0	55·1	20·4	44·9	45·4	66·8	54·3	121·1
1904–5–1907–8	25·0	53·7	21·6	46·3	46·6	63·8	55·1	118·9

AVERAGE WAGES IN DIFFERENT PARTS OF THE WORLD

The following table is compiled chiefly from the volumes of United States Consular Reports, issued under the title of 'Labour in Foreign Countries.'[1] It is impossible to suppose that the figures here given represent actual averages, but there will no doubt be a sufficient approximation to the truth to illustrate the differences affecting production under one head. The figures refer to the year 1884 or 1885.

WAGES OF ARTISANS[2]

—	Bricklayers, per week.	Engravers, per week.	Printers, per week.	Telegraph Operators, per week.	Hodmen, per week.
		s. d.	s. d.	s. d.	s. d.
England and Wales	30s. 2d.	33 7	28 6	30 6	20 0
Germany	17s. 0d.	20 6	—	20 6	11 6
France	23s. 0d.	29 6	26 6	27 6	12 6
Belgium	18s. 3d.	25 6	23 9	25 6	13 0
Switzerland	20s. 10d.	25 3	23 9	—	12 0
Russia	17s. 3d.	18 8	—	—	9 10
Italy[3]	—	—	—	—	10 6
Mexico	17s. to 28s.	—	—	—	—
British Guiana	24s. 0d.	—	—	33 6	10 6
Rio de Janeiro	27s. 0d.	—	—	43 0	18 7
London	33s. 9d.	34 0	29 2	32 0	18 4
Chicago	96s. 0d.	96 0	72 0	—	42 0
New York	80s. 0d.	64 0	52 0	48 0	44 0
Montreal	72s. to 84s.	—	48 0	46 0	30 0

AGRICULTURAL WAGES

Hamilton (Ontario), 11s. to 14s. per week, with board. Montreal, 23s. per week and house rent. Mexico, 4s. to 18s. 6d., with rations. Venezuela, 16s. to 26s., without board, in the vicinity of towns. Rio de Janeiro, 12s. and food. Argentine Republic, 15s. to 22s. 6d. per week, with board (much higher in harvest). Peru (Callao), 12s. and rice rations. British Guiana, 8s. 6d. to 18s., with lodging. Smyrna, 17s. 6d., without board. Ceylon, 1s. 4d. to 4s. 3d., without board. Victoria (Colony of), 21s., with board. New Zealand, 23s., with board.

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[1] Apart from its statistics, this work is full of interesting information with regard to the subject which forms its title.

[2] At the Witwatersrand goldfields in 1887 the approximate rates of wages were, for first-class blacksmiths, 20s. per day; carpenters, 16s.; miners, 10s.; Kaffir day labourers, 7s. 6d. per week; Kaffir night labourers, 10s. per week. (*Board of Trade Journal*, No. 17, p. 661.) 'The rates of skilled labour [in Victoria] prior to the gold-mining were about 6s. or 8s. a day; they rapidly advanced during two years, and, for a short time, stonemasons and some others were receiving 40s. a day. After a rapid fall, there has been until lately some degree of steadiness at about one-third of these singularly high rates.' (*Journal of the Statistical Society*, vol. xxiv., pp. 199–200, June 1861.)

[3] According to a Report from the British Secretary of Legation at Rome (published in the *Board of Trade Journal*, No. 7, p. 151), the wages in Italian textile factories varied from 6d. (for women in certain employments) to 4s. a day, the highest wages being earned by first-class weavers. Mr. Wardle, in his Report on the Silk Industry to the Royal Commission on Technical Education, states that women silk-workers in Piedmont do not earn much more than 6d. a day, and some earn even less.

WATER POWERS OF THE WORLD[1]

	Thousands of Horse-Power.	
	Available.	Developed or under Construction.
Austria-Hungary (pre-war)	6,460	566
Brazil	26,000	320
British Empire—(total)	60,000	2,856
Australia	1,000	67
Burma	7,000	—
Canada, Dominion of	18,260[2]	2,470[2]
Federated Malay States	?	11
Gold Coast	250	—
India	?	142[3]
Newfoundland	?	60
New Guinea	17,000	—
New Zealand	3,822	60
Nigeria	250	—
Pacific Islands	500	—
Rhodesia, N. & S.	500	—
Finland	3,000	150
France	4,600–8,000	1,200
Germany	1,425	618
Greece	66	6
Ireland	4,000	—
Italy	7,000	1,500
Japan	2,500–5,000	685
Norway	7,500[4]	1,300
Russia (pre-war)	20,000	1,000
Spain	5,000	438
Sweden	6,700	1,105
Switzerland	2,000	511
United States of America	30,000[5]	7,000

[1] Mainly from the *Canada Year Book*, 1919.

[2] Revised estimates, 1921. See above, p. 609, note 2.

[3] An under-estimate. See above, p. 507, par. **1051** with the note.

[4] See above, p. 437.

[5] Comp. above, p. 643, par. **1309**. It is useless to try to reconcile such discrepancies. The best one can do is to call attention to them, so that those who consult such tables may have their attention called to the uncertain character of the data on which they are based.

PRINCIPAL UNITS OF THE METRIC SYSTEM WITH THEIR ENGLISH EQUIVALENTS

(According to a statement made to the French Académie des Sciences on February 4, 1889, the metric system of weights and measures was obligatory in 1887 in countries with an aggregate population of 302½ millions, and was optional in other countries, among which is the United Kingdom, with an aggregate population of 97 millions. It was at the same date admitted in principle or applied in part in countries with an aggregate population of 395 millions. In all, a population of 795 millions recognised the system in some way. See 'Board of Trade Journal,' No. 32, p. 303.)

1 metre	= 39·37 inches = 3·28 feet.
(1 kilometre	= ·6214 mile.)
1 are	= 1076·4 square feet = ·0247 acre.
(1 hectare	= 100 ares, therefore = 2·47 acres.
1 sq. kilometre	= 100 hectares = ·386 sq. mile.)
1 stere (or cubic metre)	= 61,028 cubic inches = 35·317 cubic feet.
1 gramme	= ·035 oz. = ·0022 lb. avoir.
1 hectogramme	= 3·5274 oz.).
1 kilogramme	= 2·205 lbs.
1 metric quintal	= 100 kilos = 220·5 lbs.
1 metric ton	= 1000 kilos = 2204·6 lbs. = ·984 English ton.)
1 litre	= 1·76 pint.
1 hectolitre	= 22·0097 gallons, or 2·7512 bushels. Hectolitres per hectare × 1·113 = bushels per acre.
	Kilos per hectare ÷ 69 = bushels of wheat per acre at about 62 lbs. to the bushel.)

AREA, POPULATION, AND EXPORTS OF THE PRINCIPAL COUNTRIES AND COMMERCIAL ISLANDS OF THE WORLD.

The Population mostly, except for the states of post-war date, as at last pre-war census where there are census returns; in some cases, however, estimated on the basis of two succeeding census returns; the Exports generally for 1913.

EXPLANATIONS

I. Area in thousands of square miles, in italics for post-war states.
II. Population in millions in the year stated.
III. Density of Population = number of inhabitants per square mile.
IV. Value of Total Exports (in most cases special exports) in millions sterling.
V. Value of Exports per head in pounds and decimals of a pound.
VI. Post-war states are in italics.

B. = British. M. = Mandate.

Countries and Islands.	Year.	I. Area	II. Population.	III. Density	IV. Total Value Mill. £.	V. Value per Head £.
Afghanistan	—	245 (?)	6·4	—	—	—
Algeria	1911	222	5·6	25·0	20·4	3·6
Angola	—	485	4·1	8·0	1·4	0·3
Argentina	1913	1,153	7·9	6·8	96·7	12·3
Australian Commonwealth (B.)	1911	2,975	4·5	1·5	78·6	17·6
Austria	*1920*	*30*	*6·1*	*201·0*	—	—
Austria-Hungary	1910	242	49·5	204·0	115·0	2·3
Barbados (B.)	1911	0·17	0·17	1000·0	0·9	5·3
Basutoland (B.)	1911	12	0·4	33·0	—	—
Bechuanaland (B.)	1911	275	0·13	0·5	—	—
Belgium	1910	11	7·4	652·0	143·0	19·3
Belgium	*1919*	*11·7*	*7·6*	—	—	—
Bolivia	1911	708	2·3	3·4	7·8	3·4
Brazil	1913	3,276	25·0	7·6	65·0	2·6
British Guiana	1911	90	0·3	—	1·8	6·0
„ Honduras	1911	9	0·04	0·05	0·6	15·0
„ N. Borneo	1911	31	0·2	6·5	0·86	4·3
Bulgaria	1910	34	4·3	127·0	7·4	1·7
Bulgaria	*1920*	42	5·0	119·0	—	—
Canada, Dominion of	1911	3,604	7·2	1·9	95·8	13·3
Ceylon (B.)	1911	25	4·1	164·0	12·1	3·0
Chile	1912	293	3·5	11·1	29·7	8·5
China	1910	3,914	320·0	82·0	61·0	0·2
Colombia	1912	441	5·1	11·5	6·9	1·4
Congo, French. See Fr. Equatorial Africa.						
Congoland, Belgian	1913	910	15·0 (?)	16·0	2·4	0·2

Countries and Islands.	Year.	I. Area.	II. Popula-tion.	III. Density.	IV. Total Value Mill. £.	V. Value per Head £.
Costa Rica	1913	23	0·4	17·4	2·1	5·2
Cuba	1913	44	2·4	54·1	33·0	13·9
Cyprus (B.)	1911	3·6	0·14	3·9	0·7	5·0
Czechoslovakia	*1920*	*54*	*13·6*	*97·0*	—	—
Denmark	1911	16	2·8	178·0	39·7	14·3
Ecuador	1910	116	1·3	11·0	3·1	2·5
Egypt (excluding desert)	1907	12	11·2	915·0	31·7	2·8
Esthonia	*1920*	*23*	*1·7*	*76·0*	—	—
Fiji Islands (B.)	1911	7·4	0·14	1·9	1·1	8·0
Finland	*1918*	*130*	*3·3*	*26·0*	—	—
Formosa	1913	14	3·5	250·0	1·3	0·4
France	1911	207	39·6	190·0	340·3	8·6
France	*1919*	*213*	*41.5*	*195*	—	—
French Equat. Africa	1911	870	6·5	7·0	1·2	0·2
French Indo-China	1911	256	17·0	67·0	10·1	0·6
Germany	1910	209	64·9	310·4	510·0	7·9
Germany	*1919*	*183*[1]	*60·9*	*332·0*	—	—
Gold Coast (B.)	1911	80	1·5	19·0	4·3	30·0
Greece	1913	42	4·8	115·0	—	—
Guatemala	1913	48	2·0	42·0	1·5	0·7
Hawaii	1910	6·4	0·2	3·1	8·7	43·0
Honduras	1910	46	0·6	13·0	0·6	1·0
Hungary	*1921*	*35*	*7·8*	*223·0*	—	—
India, incl. Burma (B.)	1911	1,803	315·0	175·0	171·0	0·5
Ivory Coast (French)	1911	130	1·2	9·0	0·7	0·6
Jamaica (B.)	1911	4·4	0·8	182·0	2·7	3·4
Japan (excluding Korea, Formosa, and Sakhalin)	1913	149	49·6	333·0	63·2	1·3
Java and Madura	1911	51	32·0	625·0	40·0	1·3
Kenya Colony and Protectorate (B.)	1911	247	2·8	11·0	1·2	0·4
Korea	1913	85	15·0	177·0	1·5	0·1
Latvia	*1920*	*25 (?)*	*1·5*	*60·0*	—	—
Libia italiana	1911	406	0·5	1·9	0·2	0·4
Lithuania	*1919*	*60*	*4·8*	*80·0*	—	—
Madagascar	1911	228	3·1	14·0	2·4	0·8
Malay States, Federated (B.)	1911	27·5	1·0	3·7	18·0	18·0
Malta (B.)	1911	0·1	0·2	1940·0	1·2	5·0
Mauritius (B.)	1911	0·7	0·4	525·0	0·7	1·8
Mesopotamia		*143*	*2·8*	—	—	—
Mexico	1910	786	15·2	17·7	17·0	1·1
Morocco	1913	219	5·0	22·8	3·1	0·6
Mozambique		430	3·0 (?)	—	0·3[2]	0·1
Netherlands	1909	13	5·9	466·0	—	—
New Caledonia	1911	8	0·5	6·0	0·5	1·0
Newfoundland	1911	43[3]	0·2	6·0	3·0	15·0
New Guinea, Brit. See Papua.						

[1] Inclusive of the area, about 1,100 square miles, assigned by the Council of the League of Nations to Poland.

[2] Exclusive of re-exports and transit trade.

[3] Exclusive of Labrador.

Countries and Islands.	Year.	I. Area.	II. Population.	III. Density.	IV. Total Value Mill. £.	V. Value per Head £.
New Zealand . .	1911	104	1·0	9·7	23·0	22·8
Nigeria . . .	1911	332	17·0	51·0	6·0 (?)	0·4
Norway . . .	1910	125	2·4	19·2	21·2	8·8
Nyasaland . . .		40	1·2	—	0·13	0·1
Palestine (B. M.) .	*1919*	*9*	*0·7*	*72·0*	—	
Panama . . .	1912	32	0·4	19·0	0·4	0·1
Papua (B.) . . .	1913	90	0·3	3·0	0·13	0·04
Paraguay . . .	1912	76	1·0	13·0	1·0	1·0
Persia . . .	1913	628	9·5	15·1	8·7	0·9
Peru . . .	1896	722	4·6 (?)	6·6	9·1	1·9
Philippine Islands .	1913	120	8·8	73·0	10·7	1·2
Poland . . .	*1920*	*149*	*24·2*	*163·0*	—	—
Porto Rico . . .	1910	3·6	1·2	330·0	10·0	8·0
Portugal (including Madeira and Azores).	1911	35	6·0	153·0	8·2	1·4
Portuguese Africa. See Angola and Mozambique.						
Rhodesia, Northern .	1911	290	1·0	3·0	0·2	0·2
,, Southern .	1911	149	0·8	5·3	3·5	4·4
Roumania . . .	1912	53	7·5	140·4	26·8	3·6
Roumania . . .	*1919*	*122*	*17·4*	*142·2*	—	—
Russia (European) .	1912	2,000	143·0	69·2	160·0	1·1
Salvador . . .	1912	7·2	1·2	170·0	0·7	0·6
Santo Domingo . .	1913	18	0·7	39·2	2·1	3·0
Sarawak . . .	1911	42	0·6	14·0	0·8	1·3
Senegal . . .	1911	74	1·2	16·0	2·1	1·9
Serbia . . .	1913	34	4·5	134·2	3·4	0·7
Siam	1910	195	8·1	41·8	6·2	0·8
Sierra Leone, Col. (B.)	1911	4	0·08	20	1·7	2·1
Spain . . .	1910	195	20·0	103·0	39·9	2·0
Straits Settlements (B.)	1911	1	0·7	700·0	44·0	63·0
Sudan, Anglo-Egyptian	1913	985	3·0	3·0	1·2	0·4
Sweden . . .	1910	173	5·5	32·6	45·0	8·1
Switzerland . .	1910	16	3·7	235·0	58·1	15·5
South Africa, Union of (B.)	1911	473	6·0	12·6	66·6	11·1
Syria . . .	*1920*	*60*	*3·0* (?)	—	—	—
Tanganyika Terr. (B. & Belg. M.) . .	1913	384[1]	7·7[1]	20·0	1·8[1]	0·2
Tunis . . .	1911	50	1·8	36	6·2	3·4
Turkey . . .	1913	710	20·3	—	21·7	1·7
Uganda (B.) . .	1913	110	2·9	26·0	0·4	0·1
United Kingdom .	1911	122	45·4	373·0	525·0	11·6
United States (excluding Alaska and other outlying areas) . .	1910	2,974	92·0	30·9	635·0[2]	6·9
Ukraine . . .	*1919*	*498*	*46·0*	*92·0*	—	—
Uruguay . . .	1912	72	1·2	17·0	13·5	11·0
Venezuela . . .	1913	394	2·8	7·0	5·2	1·8
Yugoslavia . . .	*1920*	*96*	*11·3*	*118·0*	—	—
Zanzibar Prot. (B.) .	1910	1·0	0·2	200·0	1·0	5·0

[1] Former German E. Africa, including the areas under Belgian and British mandates. Estimated population under British mandate, 3½ millions.

[2] Including precious metals.

LIST OF ALTERNATIVE GEOGRAPHICAL NAMES

Most of the pronunciations given in the following list are merely tentative. Only people who have long resided in foreign lands and have the requisite knowledge and ear can render place-names into phonetic English. The author of this work will esteem it a great favour if such people will assist him by sending corrections, and will gladly acknowledge such.

No attempt has been made to secure completeness, but most well-known names which have undergone change have found a place in the list.

The system used in the pronunciation column is for the most part the 'R.G.S. II. System,' as given on pp. 39–43 of the *Journal R.G.S.*, vol. lvii. (January 1921).

In this system the vowels have their continental sounds :—a as in *lava* ; e as in *eh ?* or as in *bet* ; *e* as in *often* ; i as in *marine* or as in *piano* ; o as in *both* or *rotund* ; ö like the French *eu* in *peu* ; u as in *rude* or as in *pull* ; ü like the French *u* in *tu*. The following diphthongal signs are also used, *ai* as in *aisle*, au like *ou* in *out*, *ei* to represent the two sounds slurred into one syllable as in *Beirut*, *oi* as in *oil*, *ow* to replace *au* in the spelling of Chinese names. The digraph *aw* is used for the simple sound heard in *awl*.

The consonants made use of have the same sounds as in English, but c is not used at all. The letter q is used in the R.G.S. system to represent an Arabic sound very difficult to reproduce, but in the list below a *k* is substituted. The letter *s* has only one sound, that heard in *boss* ; *y* is always a consonant, as in *yard*. Where this sound is terminal and belongs to the same syllable as the preceding letter, it is represented by '. The Hungarian Nagy, for example, respelt *nod'*, has a sound closely resembling *noj*.

The following consonantal digraphs are used :—*dh* for the sound of *th* in *this* ; *gh*, the 'soft guttural' heard in *Baghdad*, as pronounced by an Arab (somewhat like the Northumbrian burr) ; *kh* like *ch* in *loch* as pronounced in Scotland ; *ng* as in *sing* ; *sh* as in *shine* ; *th* as in *thick* ; *zh* like *z* in *azure*. The combination *ch* is used as in English for the double sound heard in *church*. No provision is made for the semi-nasal heard in the French *on* and other words.

Where the original spelling is in accordance with this scheme, there is no respelling in the list below, and where the letter *c* occurs it will be understood that, unless the word is respelt, it has the sound of *s* before *e* and *i*, in other situations that of *k*.

To attempt to give all the variations in spelling even of the more familiar Chinese names would extend this list unduly, but it may be of use to mention that very frequently the combination *sz* for the sound of *s* is used in the spelling of some Chinese names, that the initial syllable *Si* often has an *h* prefixed, that *ng*, sounded like *ng* in *Sing*, not *ng* in *finger*, if sounded at all, is sometimes given and sometimes omitted at the beginning of syllables (hence such variations as Sian-fu, Singan-fu, Hsian-fu, Hsingan-fu), and that *ao*, *au*, *ou*, and *ow* are all in common use for the same sound.

conv. = conventional.

Name	Pronunciation	Language	Equivalent
Aachen	akh′en	German	Aix-la-Chapelle
Aalst	alst	Flemish	Alost
Abadan′	—	Persian	Jeziret el Khidhr
Abba′zia	abba′tsia	Italian	Opatija
Åbo	o′bo	Swedish	Turku
Adige	a′dije	Italian	Etsch
Adramyttion	adhrami′ti(on)	Greek	Edremid
Adrianople	—	English (conv.)	Edirne
Agh′ri Dagh	—	Turkish	Ararat, Masis, Kuh-i-Nuh
A′gram	—	German	Zagreb, Zagrab
Aia	a′ya	Italian	The Hague
Aix-la-Chapelle	eks la shapel′	French	Aachen
Al′ba Iulia	yu′lia	Italian	Karlsburg, Gyulafehérvár
Alep′po	—	Italian (conv.)	Haleb
Ales′sio	—	Italian	Lješ
Alexandret′ta	—	English and French (conv.)	Iskenderūn
Alma Dagh	—	Turkish	Amanus, Gavur Dagh
Alost′	—	French	Aalst
Aluta	al′uta (?)		Olt
Amanus	—	Latin (conv.)	Alma Dagh, Gavur Dagh
Amnokhos′tos	—	Greek	Famagusta
Amoy	a-moi′	Chinese (conv.)	Hsiamen
Amu Darya	a′mudar′i-a	Russian	Oxus, Jaihūn
Ancira	anchi′ra	Italian	Angora
Andrinople	—	French	Adrianople
Angora	ang′go-ra	Turkish (conv.)	Ankyra
Ankyra	ang′kira	Greek	Angora
Anti′vari	—	Italian	Tivar, Bar
Antuer′pia	—	Spanish	Antwerp
Antwerpen	antver′pen	Flemish	Antwerp
Anvers	anvers′	French	Antwerp
Anver′sa	—	Italian	Antwerp
Aquisgran	akisgran′	Spanish	Aachen
Aquisgra′na	akwisgra′na	Italian	Aachen
Araks	—	Russian	Araxes, Aras, Yeraskh
Ar′arat	—	Russian (conv.)	Masis, Aghri Dagh, Kuk-i-Nuh
Aras	—	Persian	Araxes, Araks, Yeraskh
Arax′es	—	Latin (conv.)	Araks, Aras, Yeraskh
Argyrokastron	—	Greek	Gjinokastre, Ergeri
Ash′kabad	—	Persian	Askhabad
As′khabad	—	Russian	Ashkabad
Augustówo	augusto′vo	Polish	Avgustovo
Aussig	aus′sikh	German	Usti
Avgustovo	—	Russian	Augustówo
Avlon	—	Greek	Valona, Vlore, Avloniya
Avloni′ya	—	Turkish	Valona, Vlore, Avlon
Bal′aton	—	Magyar	Platten See
Bâle	—	French	Basel
Bangkok′	—	conv.	Krung Dhebh
Banjoewangi	banyuwang′i	Dutch	Banyuwangi
Banyuwangi	—	Malay	Banjoewangi
Bar	—	Slovenian	Antivari
Basel	ba′zel	German	Bâle
Basile′a	—	Italian, Spanish	Basel
Beirut′	—	Arabic ?	Beyrout or Beyrouth
Bela Crkva	be′la krek′va	Slovenian	Weisskirchen, Fehértemplom
Belgrad	—	conv.	Beograd

Name	Pronunciation	Language	Equivalent
Beljak	belyak′	Slovenian	Villach
Beograd	—	Serbian	Belgrade
Bergen	—	Flemish	Mons
Besterczе	bester′che	Slavonic	Bistritz
Beuthen	boi′ten	German	Bytom
Beyrout, Beyrouth	beirut′	French	Beirut
Bistrica	bistri′tsa	Slovenian	Feistritz
Bistritz	bistrits′	German	Besztercze
Bitolj	bitol″	Serbian	Monastir
Björ′neborg	—	Swedish ?	Pori
Bocche di Cat′taro	bōk′ke	Italian	Boka Kotorska
Boden See	bo′den-ze	German	Constance, Lake of
Boghaz Ichi	—	Turkish	Bosporus, Bosfor, Vosporos
Boghazlar′	—	Turkish	Dardanelles, Ellēspontos
Boka Kotor′ska	—	Slovenian	Bocche di Cattaro
Bon′dos	—	Armenian	Trebizond
Bos′for	—	Russian	Bosporus, Vosporos
		Bulgarian	Boghaz Ichi
Bosna Serai′	—	Turkish	Sarajevo
Bos′porus	—	Latin (conv.)	Boghaz Ichi, Vosporos, Bosfor
Brassó	brosh′sho	Magyar	Kronstadt
Bratisla′va	—	Czech	Pressburg, Pozsony
Brno	berno	Czech	Brünn
Brüg′ge	—	Flemish	Bruges
Brünn	—	German	Brno
Brusa	—	Turkish	Prousa
Brüssel	—	Flemish	Brussels
Brüx	—	German	Most
Bruxelles	brüsel′e	French	Brussels
Budějovice	budyeyovi′tse	Czech	Budweis
Budweis	bud′vais	German	Budějovice
Bytom	bütom	Polish	Beuthen
Canton	—	Chinese (conv.)	Kwangchowfu
Capodis′tria	—	Italian	Koper
Caporet′to	—	Italian	Kobarid
Carlsbad	—	German	Karlovy Vary, Karlsbad
Cat′taro	—	Italian	Kotor
Caucasus	—	Latin (conv.)	Kavkas, Kavkasioni
Celj	tsel′	Slovenian	Cilli
Celovec	tselovets	Slovenian	Klagenfurt
Ceram	se-ram′	Dutch	Serang
Cernauţ	chernauts	Roumanian	Czernowitz
Československa (Republika)	ches′ko-slovens′ka	Czech	Czechoslovakia
Cheb	khep	Czech	Eger
Chefoo	chifu′	Chinese (conv.)	Chihfu, Yentai
Chemulp′ho	—	Korean	Jinsen
Cherso	ker′so	Italian	Cres
Chihfu	chifu′	Chinese	Chefoo, Yentai
Chilinfu	—	Chinese	Kirin
Chilung	—	Chinese	Kelung, Kiryu
Chingta′o	—	Tsingtao	Tsingtau, Seito
Chisinau	—	Roumanian	Kishinef
Chosen	chozen′	Japanese	Korea
Chyöijyudo	—	Korean	Quelpart, Saishuto
Cilli	tsil′li	German	Celj
Cluj	kluzh	Roumanian	Kolozsvár, Klausenburg
Cöln	—	German	Cologne
Cologne	koloin″ or kolon″	French and English	Cöln

Name	Pronunciation	Language	Equivalent
Con′stance (Lake)	—	conv.	Boden See
Constant′sa	—	Roumanian	Kyustendja
Constantinople	—	conv.	Istambul, Stambul
Courtrai	kurtre′	French	Kortrijk
Craco′via	—	Italian, Spanish	Cracow
Cracow	krakau	conv.	Kraków
Cres	—	Slav	Cherso
Ćusten′dil	tyusten′dil	Serbian	Kustendil
Czechoslova′kia	chekhoslova′kia	conv.	Československá (Republika)
Czernowitz	chernovits′	German	Cernauţ
Dairen′	—	?	Tairen, Ta-lien, Dal′ni
Dal′ni	—	Russian	Dairen, Ta-lien
Danzig	dan′tsikh	German	Gdańsk
Dardanelles	dar-danelz′	conv. & French	Boghazlar, Ellēspontos
Debar′	—	Serbian	Dibra
Děčin	dyechin	Czech	Tetschen
Delfina′to	—	Italian	Dauphiné, Dauphiny
Demir′ Kapi′ja	kapi′ya	Slovenian	Demir Kapu
Demir′ Kapu′	—	Turkish	Demir Kapija
Dendermon′de	—	Flemish	Termonde
Den Haag	—	Dutch (familiar)	The Hague
Devin′	—	Slav	Duino
Diarbekr	—	Turkish ?	Kara Āmid, Dikranakerd
Dibra′	—	Turkish & Albanian	Debar
Digione	dijo′ne	Italian	Dijon
Dikranakerd	—	Armenian	Diarbekr, Kara Āmid
Djakova	dya-ko-′va	Albanian	Djakovica
Djakovica	dyakovi′tsa	Serbian	Djakova
Dobrodgea	do′broja	Roumanian	Dobruja
Drač	′drach	Serbian	Durazzo
Drau	—	German	Drava, Drave
Dra′va	—	Slovenian	Drau
Drave	drav	conv.	Drau
Drim	—	Serbian	Drin
Drin	—	Turkish	Drim
Dubrov′nik	—	Slovenian	Ragusa
Duino	—	Italian	Devin
Dulcigno	dulchi′nyo	Italian	Ulcinj
Dünaburg	—	German	Dvinsk
Dünamünde	—	German	Ust Dvinsk
Duraz′zo	—	Italian	Drač
Dvinsk	—	Russian	Dünaburg
Echmiadzin	—	Russian	Ejmiadzin
Edir′ne	—	Turkish	Adrianople
Ed′remid	—	Turkish	Adramyttion
E′ger	—	German	Cheb
Ejmiadzin	—	Armenian	Echmiadzin
Eperjes	eperyesh	Magyar	Presov
Ergeri	—	Turkish	Argyrokastron, Gjinokastre
Erzerum	—	Turkish (conv.)	Karin
Erzinjan	—	Turkish (conv.)	Yerznka
Escocia	esko′thia	Spanish	Scotland
Eski Zagra	—	Turkish	Stara Zagora
Eszék	es′ek	Magyar	Osijek, Osjek
Esztergom	estergom′	Magyar	Gran
Etsch	ech	German	Adige
Euboea	yubi′a[1]	Latin (conv.)	Negroponte
	([1] pronounced in	Greek evvi′a)	
Famagusta	—	Turkish (conv.)	Amnokhostos
Fehértemplom	—	Magyar	Weisskirchen (Roumania)
Feistritz	fais′trits	German	Bistrica

Name	Pronunciation	Language	Equivalent
Fengtienfu	—	Chinese	Mukden
Fili′be	—	Turkish	Philippopolis
Fiu′me	—	Italian	Rijeka, Rjeka, St. Veit am Flaume
Florina	—	Greek	Lerin
Flushing	—	English (conv.)	Vlissingen
Formo′sa	—	Portuguese (conv.)	Taiwan
Fred′rikshamn	(ham)	Swedish	Hamina
Friedrichstadt	fri′drikhshtat	German (conv.)	Jaunjelgava
Fünfkirchen	fünfkirkhen	German	Pečuj, Pécs
Furnes	fürn	French	Veurne
Gal′les	—	Italian	Wales
Gând	—	French	Ghent
Gante	—	Spanish	Ghent
Gävle	yef′le	Swedish	formerly Gefle, Gäfle
Gavur Dagh	—	Turkish	Amanus
Gdańsk	gdan'sk	Polish	Danzig
Geertsbergen	—	Flemish	Grammont
Gent	—	Flemish	Ghent
Giaour Dagh	jaur dagh	conv.	Alma Dagh
Giurgevo	jurje′vo	Bulgarian	Giurgiu
Giurgiu	jurju	Roumanian	Giurgevo
Gorica	gori′tsa	Slovenian	Gorizia, Görz
Gorizia	gori′tsia	Italian	Gorica, Görz
Görz	—	German	Gorica, Gorizia
Gottschee	got′she	German	Kočevje
Grammont	—	French	Geertsbergen
Gran	—	German	Esztergom
Gravosa	—	Italian	Gruž
Grossa	—	Italian	Dugi
Grosswardein	grosvar′dain	German	Nagyvárad, Oradia Mare
Gruž	gruzh	Croatian	Gravosa
Györ	dyör	Magyar	Raab
Gyulafehérvár	dyulafehervar′	Magyar	Alba Iulia, Karlsburg
Hague, The	—	conv. English for Dutch	's Gravenhage, or Den Haag
Haifang′	—	Chinese	Haiphong
Haiphong	haifong′	conv. & French	Haifang
Haleb	—	Arabic	Aleppo
Hamina	—	Finnish	Fredrikshamn
Hancheng	—	Chinese	Seoul, Keijo
Hang′ö	—	Swedish	Hanko
Han′ko	—	Finnish	Hangö
Harbin	—	Chinese (conv.)	Kharbin
Haye, La	la he	French	The Hague
Helsingfors	—	Swedish	Helsinki
Helsinki	—	Finnish	Helsingfors
Her′mannstadt	—	German	Sibiu, Nagyszeben
Hranice	hrani-tse	Czech	Weisskirchen (Moravia)
Hsiamen	—	Chinese	Amoy
Hvar	—	Croatian	Lesina
Iasi	yashi	Roumanian	Jassy
Iceland	—	conv. for Icelandic	I′sland
Iglau	—	German	Jihlava
Ikonion	—	Greek	Konia
Inghilterra	—	Italian	England
Inglaterra	—	Spanish	England
Ipek	—	Turkish	Peć, Pech
Ishtib	—	Turkish	Štip
Iskenderūn	—	Turkish	Alexandretta
Islini′ye	—	Turkish	Sliven, Slivno
Ison′zo	—	Italian	Soča

Name	Pronunciation	Language	Equivalent
Istam'bul	—	Turkish	Constantinople
Izmid	—	Turkish	Nikomēdeia
Izmir	—	Turkish	Smyrna
Jáchymov	yakh'i-mof	Czech	Joachimsthal
Jaihun	—	Persian ?	Oxus, Amu Darya
Jakobstad	ya'kob-shtat	German	Pietarsaari
Janina	—	Slovenian	Yannina, Yaniya
Jarosław	yaros'waf	Polish	Yaroslav
Jassy	yashi	conv.	Iasi
Jaunjelga'va	yaunyelga'va	Lettish	Friedrichstadt
Jelgava	yelga'va	Lettish	Mitau
Jerez	khereth'	Spanish	(formerly) Xeres
Jihlava	yihla'va	Czech	Iglau
Jinsen	—	Japanese	Chemulpho
Joachimstal	(y)	German (conv.)	Jáchymov
Jugoslavija	yugoslavi'ya yugosla'via	Slovenian	Yugoslavia
Kalkande'len	—	Turkish	Tetovo
Kanto'shu	—	Japanese	Kwantung
Karafu'to	—	Japanese	Sakhalin (S. of 50° N.)
Karin	—	Armenian	Erzerum
Karlócza	karlot'sa	Magyar	Karlowitz, Karlovci
Karlovac	karlo'vats	Slovenian	Karlstadt
Karlovci	karlov'tsi	Croatian	Karlócza, Karlowitz
Kar'lovy Váry	kar'lovi vari	Czech	Karlsbad, Carlsbad
Karlowitz	kar'lovits	German	Karlovci, Karlócza
Karlsbad	karlz'bad	German	Carlsbad, Karlovy Vary
Karlsburg	karlz'burg	German	Alba Iulia, Gyulafehérvár
Karlstadt	karl'shtat	German	Karlovac, Károlyvaros
Károlyváros	ká'rol'va'rosh	Magyar	Karlovac, Karlstadt
Kaschau	kashau	German	Kassa
Kassa	kash'a	Magyar	Kaschau
Kavkasio'ni	—	Georgian	Caucasus, Kavkaz
Kavkaz	kaf'kas	Russian	Caucasus, Kavkasioni
Kazvin	—	Persian (conv.)	Qazvin
Kei'jo	—	Japanese	Seoul, Hancheng
Kelung'	—	Chinese (conv.)	Chilung, Kiryu
Khar'bin	—	Russian	Harbin
Khaskö'i	—	Turkish	Khaskovo
Khasko'vo	—	Slav	Khasköi
Kiirun	—	Official Japanese	Kelung
Kirin'	—	Chinese (conv.)	Chilinfu
Kiryu	—	Japanese	Kelung, Chilung
Kishinef	—	Russian	Chisinau
Klagenfurt	—	German	Celovec
Klau'senburg	—	German	Cluj, Kolozsvár
Klis	—	Croatian	Clissa
Ko'barid	—	Slav	Caporetto
Kolozsvár	ko-lozh-var'	Magyar	Cluj, Klausenburg
Komar'no	—	Czech	Komorn
Komárom	—	Magyar	Komorn
Ko'nia	—	Turkish (conv.)	Qoniya, Ikonion
Koper'	—	Slav	Capodistria
Köpri'li	—	Turkish	Veles
Korčula	korchu'la	Croatian	Curzola
Korea	kori'a	Chinese (conv.)	Chosen
Körmöczbánya	körmötsban'ya	Magyar	Kremnitz
Kortrijk	kortraik	Flemish	Courtrai
Korunat'	—	Croatian	Incoronata
Košice	koshi'tse	Czech	Kaschau, Kassa
Kotor'	—	Slovenian	Cattaro
Krain'burg	—	German	Kranj

Name	Pronunciation	Language	Equivalent
Kraków	kra'kuf	Polish	Cracow
Kranj	kran'	Slovenian	Krainburg
Krašovo	krasho'vo	Slovenian	Krassova
Krassova	krasho'vo	Magyar	Krašovo
Kremnitz	kremnits	German	Körmöczbánya
Krk	—	Slav	Veglia
Kron'stadt	—	German	Brassó
Krung Dhebh	—	Siamese	Bangkok
Kuh-i-Nuh	—	Persian	Ararat, Masis, Aghri Dagh
Kul'pa	—	German	Kupa
Ku'pa	—	Slovenian	Kulpa
Kwangchowfu	—	Chinese	Canton
Kwantung	—	Chinese	Kantoshu
Kyustendil	—	Turkish	Ćustendil
Kyustend'ja	—	Turko-Bulgarian	Constantsa
Laas	las	German	Lož
Lagos'ta	—	Italian	Lastovo
Laibach	lai'bakh	German	Ljubljana, Lyublyana
Laodikeia	laodik'ia	Greek	Latakia
Lataki'a	—	Arabic (conv.)	Laodikeia
Lemberg	—	German (conv.)	Łwów
Lerin	—	Slovenian	Florina
Le'sina	—	Italian	Hvar
Leuven	löven	Flemish	Louvain
Levkas'	lefkas'	Greek	Santa Maura
Liberec	li'berets	Czech	Reichenberg
Liége	liezh'	French	Luik, Lige, Lüttich
Lige	lizh	Walloon	Liége, Luik, Lüttich
Liegi	lie'ji	Italian	Liége
Lieja	lie'ha	Spanish	Liége
Lier	—	Flemish	Lierre
Lierre	—	French	Lier
Lika-Korba'va	—	Magyar	Lika-Krbava
Lika-Krba'va	—	Croatian	Lika-Korbava
Lis'sa	—	Italian	Vis
Lješ	lyesh	Slovenian	Alessio
Ljubljana	lyublya'na	Slovenian	Laibach
Lošinj	loshin'	Slav	Lussin
Lova'nia	—	Italian	Louvain
Löwen	löven	German	Louvain
Lubia'na	—	Italian	Ljubljana, Laibach
Luik	loik	Flemish	Liége, Lige, Lüttich
Lushun	—	Chinese	Port Arthur, Ryojun
Lus'sin	—	Italian	Lošinj
Lüttich	lut'ikh	German	Liége, Luik, Lige
Łwów	wuf	Polish	Lemberg
Lyublyana	(*see* Ljubljana)		
Magon'za	—	Italian	Mainz
Maguncia	magun'thia	Spanish	Mainz
Mainz	maints	German	Mayence
Malines	malin'	French	Mecheln
Mallorca	malyor'ka	Spanish	Majorca
Mar'burg	—	German	Maribor
Marian'skéLázné	—	Czech	Marienbad
Maria Theresiopel	mari'a terezio'pel	German	Subotica, Szabadka
Mar'ibor	—	Slovenian	Marburg
Mari'enbad	—	German	Marianské Lázné
Maros	ma'rosh	Magyar	Moriš
Ma'sis	—	Armenian	Ararat, Aghri Dagh, Kuh-i-Nuh
Mayence	—	French	Mainz

NAME	PRONUNCIATION	LANGUAGE	EQUIVALENT
Mecheln	mekh'eln	Flemish	Malines
Mitau'	—	German (conv.)	Jelgava
Mohač	mohach'	Slovenian	Mohacz
Mohacz	mohach'	Magyar	Mohač
Monastir'	—	Turkish, Greek	Bitolj
Mons	mons (semi-nasal)	French	Bergen
Moriš	morish'	Slovenian	Maros
Most	—	Czech	Brüx
Muk'den	—	Russian	Fengtienfu
Mül'hausen	—	German	Mulhouse
Mulhouse	müluz'	French	Mülhausen
Nagyszeben	nod'seben	Magyar	Sibiu, Hermannstadt
Nagyvárad	nod'va'rad	Magyar	Oradia Mare, Grosswardein
Nanching'	—	Chinese	Nanking
Nanking'	—	Chinese (conv.)	Nanching
Naren'ta	—	German	Neretva
Negropon'te	—	Italian	Euboea
Neret'va	—	Slovenian	Narenta
Neufahrwasser	noifarvas'-er	German	Nowy port
Neusatz	noi'zats	German	Novi Sad, Ujvidek
Neutra	noitra	German	Nyitra, Nitra
Nikomēdeia	nikomedhi'a	Greek	Izmid
Nitra	—	Czech	Neutra, Nyitra
Nova Za'gora	—	Bulgarian	Yeni Zagra
Novi Sad	—	Slovenian	Neusatz, Ujvidek
Nowy port	novi port	Polish	Neufahrwasser
Nyitra	—	Magyar	Neutra, Nitra
Nystad	ni'stad	Swedish	Uusikaupunki
Odrin'	—	Bulgarian	Adrianople
Oedenburg	ödenburg	German	Sopron
Ofen	—	German	Pest
Oh'rid	—	Slovenian	Okhrida
O'khrida	—	Turkish	Ohrid
Ol'mütz	ol'müts	German	Olomouc
Olomouc	olomo-uts'	Czech	Olmütz
Oltu	olt	Roumanian	Aluta
Opati'ja	(ya)	Slav	Abbazia
Opa'va	—	Czech	Troppau
Oprtalj	oprtal''	Slav	Portole
Ora'dia Mare	—	Roumanian	Grosswardein, Nagyvárad
Oršava	or'shava	Slovenian	Orsova
Orsova	or'shovo	Magyar	Oršava
O'sek	—	Slovenian	Esseg, Osijek, Eszek, Osjek
Osijek	o'siyek	Croatian	Esseg, Essegg, Eszek, Osek
Osjek	os'yek	Croatian	Esseg, Essegg, Eszek, Osek
O'sor	—	Slav	Ossero
Oulu	o'ulu	Finnish	Uleåborg
Oxus	—	Latin (conv.)	Amu Darya, Jaihun
Palmy'ra	—	Latin (conv.)	Tadmur
Pančevo	pan'chevo	Slovenian	Pancsova
Pancsova	pan'chovo	Magyar	Pančevo
Parainen	—	Swedish	Pargas
Paren'zo	—	Italian	Porec
Par'gas	—	Finnish	Parainen
Parigi	pari'ji	Italian	Paris
Passar'evitz	(ts)	German	Požarevac
Pazar'	pa-zar'	Slovenian	Janica, Jenidje Vardar
Peć	pet'	Slovenian	Ipek
Pech			
Pécs	pech	Slovenian	Fünfkirchen

Name	Pronunciation	Language	Equivalent
Pečuj	pech'ui	Slovenian	Fünfkirchen
Peiching'	—	Chinese	Peking
Peking'	—	Chinese (conv.)	Peiching
Pelješac	pél'yeshats	Slovenian	Sabbioncello
Perle'pé	—	Turkish	Prilep, Prilip
Pest	pesht	Magyar	Ofen
Pétervá'rad	—	Magyar	Peterwardein, Petrovaradin
Peterwardein	petervar'dain	German	Petrovaradin, Pétervárad
Petrova'radin	—	Croatian	Pétervárad, Peterwardein
Petrozsény	petrozhen'	Magyar	Pietroşani, Pietroshani
Pet'tau	—	German	Ptuj
Philippo'polis	—	Latin (conv.)	Filibe, Plovdiv
Pietarsaa'ri	—	Finnish	Jakobstad
Pietroşani Pietrosha'ni	—	Roumanian	Petrozsény
Pil'sen	—	German	Plzen
Platten See	plat'en ze	German	Balaton
Ple'ven	—	Serbian	Plevna
Plev'na	—	Turkish	Pleven
Plovdiv	—	Bulgarian	Philippopolis
Plzen	pelzen	Czech	Pilsen
Po'la	—	German	Pulj
Poreč	porech'	Slovenian	Parenzo
Po'ri	—	Finnish	Björneborg
Port Arthur	—	Russian (conv.)	Lushun, Ryojun
Posen	po'zen	German	Poznań
Požarevac	pozha'revats	Serbian	Passarevitz
Požega	pozhe'ga	Croatian	Pozsega
Poznań	poznan'	Polish	Posen
Pozsega	pozhe'ga	Magyar	Požega
Pozsony	pozhon''	Magyar	Pressburg, Bratislava
Prag	—	German	Prague, Praha
Prague	—	French	Praha, Prag
Pra'ha	—	Czech	Prague, Prag
Presov	—	Czech	Eperjes
Press'burg	—	German	Pozsony, Bratislava
Prilep', Prilip'	—	Slovenian	Perlepe
Priz'ren	—	Slovenian	Prizrend
Priz'rend	—	Turkish	Prizren
Prousa	pru'sa	Greek	Brusa
Ptuj	ptu'i	Slovenian	Pettau
Pulj	pul'	Slovenian	Pola
Quelpart	kwel'part	Dutch (conv.)	Chyöijyudo, Saishuto
Raab	—	German	Györ
Rab	—	Croatian	Arbe
Rad'mansdorf	—	German	Radovljica
Radovljica	radovlyi'tsa	Slovenian	Radmansdorf
Ragu'sa	—	Italian	Dubrovnik
Rasa	—	Slav	Arsa
Rau'ma	—	Finnish	Raumo
Rau'mo	—	Swedish	Rauma
Reich'enberg	raikh'enberg	German	Liberec, Liberets
Re'no	—	Italian	Rhine
Re'vel	—	Russian (conv.)	Tallinn
Rijeka Rjeka	riye'ka rye'ka	Slovenian	Fiume, St. Veit am Flaum
Ro'dano	—	Italian	Rhone
Rodosto	—	Italian (conv.)	Tekir Dagh
Roeselaere	ruzela're	Flemish	Roulers
Roulers	rulers'	French	Roeselaere
Rovigno	rovi'nyo	Italian	Rovinj
Rovinj	rovin''	Slovenian	Rovigno

Name	Pronunciation	Language	Equivalent
Ru'miya	—	Turkish	Urmia, Urúmieh (Urūmīyeh)
Rušćuk	rushchuk	Turkish	Ruse
Ru'se	—	Bulgarian	Rušćuk
Ryojun	—	Japanese	Port Arthur, Lushun
Sabbioncello	sabbionchel'lo	Italian	Pelješac
Sagor	za'gor	German	Zagorje
Sai'da	—	Arabic	Sidon
Saishu'to	—	Japanese	Quelpart, Chyöijyudo
Sakha'lin	—	Russian	Karafuto
Salo'na	—	Italian	Solin
Santa Mau'ra	—	Italian	Levkas
Sarajevo	saraye'vo	Serbian	Bosna Serai
Šarplan'ina	shar-	Serbian	Shardagh
Scardo'na	—	Italian	Skradin
Schemnitz	shemnits	German	Selmecz-es-Bélabánya, Silesia
Schlesien	shle'zien	German	Stiavnica
Scozia	sko'tsia	Italian	Scotland
Scu'tari	—	Italian	Skadar, Shkodra
Sebe'nico	—	Italian	Šibenik
Segna	se'nya	Italian	Senj, Zengg
Seito	sai'to	Japanese	Tsingtao,Tsingtau,Chingtao
Selce	sel'tse	Croatian	Szelce
Selmecz-es-Bélabánya	shelmech-esh-belabanya	Magyar	Schemnitz
Semen'dria	—	German	Smederevo
Semlin	zem'lin	German	Zemun, Zimony
Senj	sen'	Slovenian	Zengg, Segna
Seoul	se-ul'	Korean (conv.)	Keijo, Hancheng
Serang'	—	Malay ?	Ceram
's Gravenha'ge	—	Dutch	The Hague
Shantow'	—	Chinese	Swatow
Shko'dra	—	Albanian	Skadar, Scutari
Shumla	—	Turkish	Šumen
Šibenik	shibenik	Slovenian	Sebenico
Sibiu'	—	Roumanian	Hermannstadt, Nagyszeben
Sidon	—	Hebrew (conv.)	Saida
Silesia	saili'zhia	English (conv.)	Schlesien, Szlask
Si'sak Si'sek	—	Croatian	Sziszek, Sissek
Sis'sek	—	German	Sisek, Sisak, Sziszek
Şis'tov	shishtov	Roumanian	Sistova
Sis'tova	—	Bulgarian (conv.)	Şiştov
Ska'dar	—	Slovenian	Scutari, Shkodra
Skoplje	skop'lye	Slovenian	Üsküb
Sle'sia	—	Italian, old Polish	Silesia, Szlask
Smedere'vo	—	Slovenian	Semendria
Smyrna	—	Latin (conv.)	Izmir
Soča	soch'a	Slovenian	Isonzo
Soerabaja	surabai'a	Dutch	Surabaya
Solin'	—	Croatian	Salona
Somes,	somesh	Roumanian	Siamos
Sopron	shopron	Magyar	Oedenburg
So'ria	—	Italian	Syria
Spa'lato	—	Italian	Spljet
Spljet	splyet	Slovenian	Spalato
Srem Srijem Srjem	— sri'yem sryem	Croatian	Szerém Syrmien
Stambul	—	Turkish	Constantinople

Name	Pronunciation	Language	Equivalent
Stara Za'gora	—	Bulgarian	Eski Zagra
Steinamanger	shtainamang'er	German	Szombathely
Stiavnica	stiavni'tsa	Czech	Schemnitz
Štip or Shtip	shtip	Slovenian	Ishtib
Ston	—	Croatian	Stagno
Strasbourg	strasbur'	French	Strassburg
Strassburg	stras'burkh	German	Strasbourg
St. Trond	—	French	St. Truijen
St. Truijen	—	Flemish	St. Trond
Stuhlweissenburg	shtulvaisen-burg	German	Szekesfehérvár
St. Veit am Flaum	—	German	Rijeka, Rjeka, Fiume
Suboti'ca Suboti'tsa	—	Slovenian	Szabadka, Maria Theresiopel
Suecia	sue'thia	Spanish	Sweden
Suiza	sui'tha	Spanish	Switzerland
Sumen	shumen	Bulgarian	Shumla
Suomenlinna	—	Finnish	Sveaborg
Šur	—	Arabic	Tyre, Zor
Suraba'ya	—	Malay ?	Soerabaja
Sve'aborg	—	Swedish	Suomenlinna
Svezia	sve'tsia	Italian	Sweden
Svizzera	svi'tsera	Italian	Switzerland
Swatow	—	Chinese (conv.)	Shantow
Syrmien	sir'mien	German	Srijem, Srjem, Srem, Szerém
Szabadka	sobod'ko	Magyar	Subotica, Maria Theresiopel
Szamos	samosh	Magyar	Somes
Szeged	seged	Magyar	Szegedin
Szegedin	—	German	Szeged
Szekesfehérvár	sekeshfehervar	Magyar	Stuhlweissenburg
Szelce	sel'tse	Magyar	Selce
Szerém	serem'	Magyar	Syrmien, Srijem, Srjem, Srem
Sziszek	sis'sek	Magyar	Sissek, Sisek, Sisak
Szlask	shlask	Polish	Silesia
Szombathely	sombot-hel''	Magyar	Steinamanger
Tad'mur	tad'mur	Arabic	Palmyra
Tai'ren	—	?	Dairen
Taiwan'	—	Japanese and Chinese	Formosa
Ta-lien'	—	Chinese	Dairen, Dal'ni
Tallinn'	—	Esthonian	Revel
Tamiš	ta'mish	Slovenian	Temes
Tam'merfors	—	Swedish ?	Tampere
Tam'pere	—	Finnish	Tammerfors
Tara'bulus Shām	—	Arabic	Tripoli
Tauris	—	Italian	Tabriz
Tekir Dagh	—	Turkish	Rodosto
Temes	te'mesh	Magyar	Tamiš
Temesvár	temeshvar'	Magyar	Temišvar, Timisioara
Temišvar	temishvar'	Slovenian	Temesvar
Termonde	—	French	Dendermonde
Te'tovo	—	Slovenian	Kalkandelen
Theiss Teiss	tais	German	Tisa
Tienen	ti'nen	Flemish	Tirlemont
Tiflis'	—	Russian (conv.)	Tpilisi
Timisioa'ra	—	Roumanian	Temesvár, Temišvar
Tirlemont	—	French	Tienen

Name	Pronunciation	Language	Equivalent
Ti′sa	—	Slovenian	Theiss, Teiss
Tisza	tisa	Magyar	Tisa, Teiss
Tivar′	—	Albanian	Antivari, Bar
Tongern	tong′ern	Flemish	Tongres
Tongres	—	French	Tongern
Tpilisi	tepi′lisi	Georgian	Tiflis
Traù	—	Italian	Trogir
Trau′tenau	—	German	Trutnov
Tre′bizond	—	Turkish (conv.)	Bondos
Trencsen	trenchen	Magyar	Trentschin
Trentschin	trenchin	German	Trencsen
Trèves	trev	French	Trier
Trier	trir	German	Trèves
Tries′te	—	Italian	Trst
Tri′poli	—	Italian (conv.)	Tarābūlūs Shām
Tro′gir	—	Croatian	Traù
Trop′pau	—	German	Opava
Trst	trest	Slovenian	Trieste
Trsteno	treste′no	Croatian	Cannosa
Trut′nov	—	Czech	Trautenau
Tsingtao	—	Chinese	Seito, Tsingtau, Chingtao
Tsingtau	—	German	Tsingtao, Seito, Chingtao
Turku	—	Finnish	Åbo
Tyre	tair	Arabic (conv.)	Sur, Zor
Učka	uchka	Slav	Monte Maggiore
Ugliano	ulya′no	Italian	Ugljan
Ugljan	ugl′yan	Croatian	Ugliano
Ujvidek	uividek′	Magyar	Novi Sad, Neusatz
Ulbo	—	Italian	Olib
Ulcinj	ultsin′	Slovenian	Dulcigno
Uleåborg	ul′eobor	Swedish (conv.)	Oulu
Ungvár	—	Magyar	Užhorod
Ur′mia	—	Armenian	Urúmieh Rumiya
Uru′mieh, Uru′miyeh	—	Persian	Urmia, Rumiya
Üsküb	—	Turkish	Skoplje
Üsküdar	—	Turkish	Skutari (Asia Minor)
Ust Dvinsk	—	Russian	Dünamünde
Usti	—	Czech	Aussig
Uusikaupunki	—	Finnish	Nystad
Užhorod	uzh′horot	Czech	Ungvár
Vács	vach	Magyar	Waitzen
Vaasa	—	Finnish	Vasa
Vág	—	Magyar	Waag
Valo′na	—	Italian (conv.)	Vlore, Avlon, Avloniya
Várásd	varasht	Magyar	Varaždin
Varaždin	varazh′din	Croatian	Várásd
Varsa′via	—	Spanish	Warsaw
Varso′via	—	Italian	Warsaw
Varsovie′	—	French	Warsaw
Vasa	—	Swedish	Vaasa
Veglia	ve′lya	Italian	Krk
Veles	—	Serbian	Köprili
Ventspils	—	Lettish	Windau, Vindava
Versecz	vershets	Magyar	Vršac
Veurne	vör′ne	Flemish	Furnes
Viborg	vi′bor	Swedish	Viipuri
Vidin	—	Bulgarian	Widdin
Viipuri	—	Finnish	Viborg
Villach	vil′lakh	German	Beljak
Vinda′va	—	Russian	Windau, Ventspils

Name	Pronunciation	Language	Equivalent
Vis	—	Croatian	Lissa
Vis′tula	—	English (conv.)	Wisła, Weichsel
Vliss′ingen	—	Dutch	Flushing
Vlore	—	Albanian	Valona, Avlon, Avloniya
Voden	—	Slovenian	Vodena
Vo′dena	—	Greek	Voden
Vodnjan	vodnyan′	Slav	Dignano
Vos′poros	—	Greek	Bosporus, Bosfor, Boghaz Ichi
Vršac	vershats	Slovenian	Versecz
Waag	vag	German	Vág
Waitzen	vai′tsen	German	Vacs
Warszawa	varshava	Polish	Warsaw
Waveren	va′veren	Flemish	Wavres
Wavres	vavr	French	Waveren
Weichsel	vaik′sel	German	Vistula, Wisła
Weisskirchen (Moravia)	vaiskïr′khen	German	Hranice
Weisskirchen (Roumania)	vaiskïr′khen	German	Bela Crkva, Fehértemplom
Widdin	vidin	German	Vidin
Windau	vin′dau	German	Ventspils, Vindava
Wisła	vis′wa	Polish	Vistula, Weichsel
Yaniya	—	Turkish	Yannina, Janina
Yan′nina	—	Greek (conv.)	Janina, Yaniya
Yaroslav	—	Ukraine	Jarosław
Yassy	yashi	conv.	Iaşi
Yeni Zagra	—	Turkish	Nova Zagora
Yentai	—	Chinese	Chefoo, Chihfu
Yeraskh	—	Armenian	Araxes, Araks, Aras
Yerznka	—	Armenian	Erzinjan
Ypern	i′pern	Flemish	Ypres
Ypres	ipr	French	Ypern
Yugoslavia	—	conv.	Jugoslavija
Zadar	—	Slovenian	Zara
Zagorje	zagor′ye	Slovenian	Sagor
Zágráb	—	Magyar	Agram, Zagreb
Zagreb	—	Slovenian	Agram, Zágráb
Zara	dza′ra	Italian	Zadar
Zemun′	—	Slovenian	Semlin, Zimony
Zengg	tseng	German	Senj, Segna
Zimony	zimon′	Magyar	Zemun, Semlin
Znaim	tsnaim	German	Znojmo
Znojmo	znoimo	Slavonic	Znaim
Zor	—	Hebrew	Tyre, Sur

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Names not found in the index should be looked for in the list of Alternative Geographical Names immediately preceding. Conventional abbreviations are occasionally used to save space, as, *e.g.*, Arch. = Archipelago; Mts. = Mountains; Penin. = Peninsula; pop. = population; prov. = province; R. = River; Ry. = Railway; rnfall. = rainfall; temp. = temperature, etc.

Printed in England at The Ballantyne Press
Spottiswoode, Ballantyne & Co. Ltd.
Colchester, London & Eton